1/11/88 U6910-1

December 1987
Volume 44, Number 6

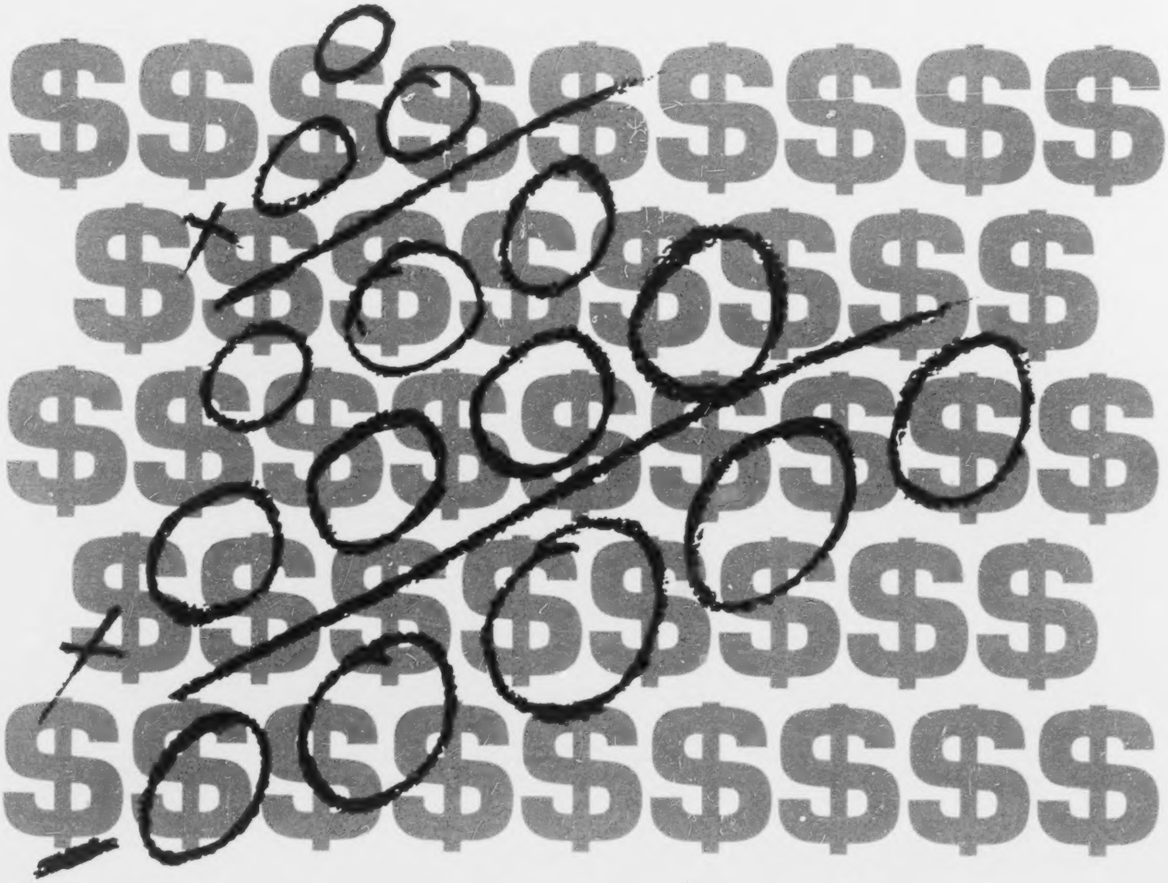
Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

Perspectives on the Federal Debt: 1791–1987 / 2

Japan, USA: The Impact of the Diamond Star Plant / 7

Job Growth: A Look at Illinois and Its Counties / 10



December 1987 Illinois Business Review Volume 44 Number 6

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Director, Robert W. Resek; *Acting Director,* Marvin Frankel; *Editor,* William R. Bryan; *Technical Editor,* Janet R. Fitch; *Designers,* Ronald Sterkel, Rajene Fry, and Kimberly Nyberg; *Research Assistants,* Paul C. Bishop, Gregory A. Gilbert, Martin Dwyer, Mary A. Laschober, and Anne E. Winkler; *Director of the Office of Real Estate Research,* James R. Follain.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide businessmen of the state and other interested persons with current information on business conditions.

Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.

The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois.

Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

WILLIAM R. BRYAN

Perspectives on the Federal Debt: 1791–1987

The federal debt has risen substantially during the period since 1974, having reached nearly $2.4 trillion by the end of the fiscal year just completed. The series of very large deficits since 1974 has added just under $2 trillion to the federal debt. In popular discussions of these deficits, it has become common to observe that they exceed the cumulative deficits of the preceding 183 years of the nation's history.

The purpose of this article is to place the recent growth of the federal debt into historical perspective. Although there can be no doubt about the facts relating to the federal debt, there is considerable question about what those facts mean. It is of interest, for example, to question whether the experience of the current decade is unusual. Is it unprecedented? Does it represent a marked departure from historical trends?

Deficits and Debt

A deficit or surplus emerges by virtue of a difference between spending and income during some period of time. To the extent that spending exceeds income, there is a deficit; to the extent that income exceeds spending, there is a surplus.

The concepts of debt and deficit are related. One means by which a household, business firm, or government is able to finance a deficit is by borrowing. That is, it exchanges a promise to pay for the means of payment needed to finance its deficit. In the process, depending upon the nature of the expenditure being financed, there can be a decline in the net worth of the entity involved. If the deficit emerges by virtue of the purchase of an asset, net worth may not be impaired. If consumption is financed, net worth declines.

There is an important point to be made. Namely, in dealing with individuals and business firms there is no unambiguous interpretation that can be placed on the expansion or contraction of the quantity of their outstanding debt. An expanding debt may reflect persistent deficits, or it may reflect a rearrangement in, or an expansion of, assets.

In their accounting practices, private businesses seek to recognize this distinction. Even though they may make very large outlays on building or other capital equipment during a year, they do not show all of those expenses on their books during that year. Instead, on their balance sheet they show increases in both their assets and their liabilities. Subsequently, on their income statement they allocate those expenses over many years as the capital depreciates.

Not so for the federal government. The United States government records all of its expenses for capital expenditures in the year during which the actual outlays occur. Thus, for example, if the US Navy takes delivery of an aircraft carrier during the fiscal year ending in 1988, all the expenses for that carrier are shown on the books of the government during that single year—even though the carrier may be in the fleet for thirty years. Consequently, for the most part the federal debt is the year-after-year accumulation of current account deficits and surpluses.

There are other important alternatives among current account budget concepts. One way of defining federal budget outlays and receipts, referred to as the total budget, places emphasis upon being all-embracing. Outlays are defined as including transfer payments and lending, in addition to expenditures for currently produced goods and services. Receipts within this framework include loan repayments, social security contributions, as well as tax revenues. In contrast, the national income accounts budget uses a second way of defining federal outlays and receipts. Federal expenditures are limited to expenditures for goods and services; receipts are limited to tax revenues from current income.

Differences between annual deficits measured within these alternative budget concepts can be quite large, or quite small. In fiscal 1980 the total budget deficit was 46.4 percent larger than the national income accounts measure, $73.8 billion compared with $50.4 billion. By comparison, the total deficit in fiscal 1986 was only 4.7 percent larger than the income accounts budget. Moreover, the total deficit may be smaller than the national income accounts deficit. For example, in fiscal 1987 the total deficit was $12.7 billion smaller than the income accounts deficit, according to the available estimates at this writing. Indeed, it is possible for one measure to be in deficit while the other is in surplus.

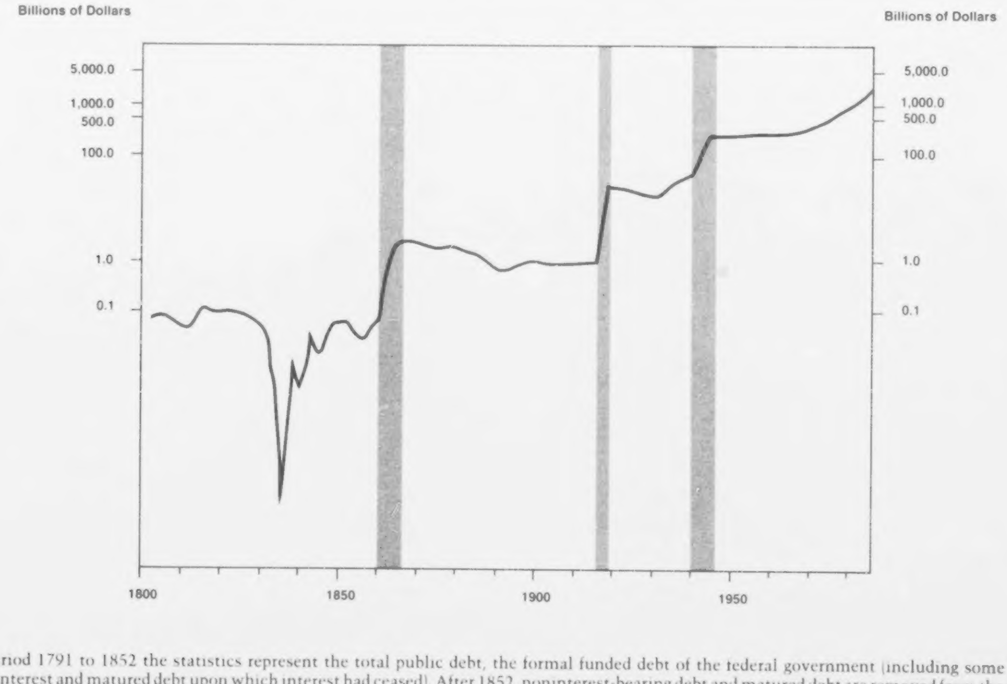
History of the Debt

Arguments relating to deficits and debt have persisted throughout the nation's history. A major issue associated with the ratification of the Constitution was whether the debt connected with financing the Revolution would be paid by the new central government. At length, the debt was "funded."

Chart 1 shows the outstanding federal debt for the period from 1800 to 1986. The vertical axis of Chart 1 is scaled logarithmically. With such a scale, identical percentage increases show identical vertical movements, even though absolute amounts may be quite different. On such a chart, an increase from 5 to 10 would look to be the same size as an increase from 50 to 100 or 500 to 1,000. Such a representation of data is generally considered to be appropriate for viewing developments relating to growth over long periods of time.

The nation came into being with a debt of $75.5 million. Indebtedness moved irregularly downward until the War of 1812, then rose again. Following the war, steady progress was made toward repaying the debt. With the election of Andrew Jackson, debt repayment efforts intensified. Indeed, by 1835 the

Chart 1. Public Debt of the Federal Government: 1791–1986



Note: For period 1791 to 1852 the statistics represent the total public debt, the formal funded debt of the federal government (including some obligations that bear no interest and matured debt upon which interest had ceased). After 1852, noninterest-bearing debt and matured debt are removed from the series. The public debt includes a small amount of obligation not subject to the statutory debt ceiling, thereby differing from the legally defined gross federal debt. For 1791 to 1842 the statistics relate to January 1; from 1842 to 1976 they relate to June 30; beginning in 1977 the fiscal year ends September 30.

United States was essentially out of debt.

There have been large increases in debt associated with each, or nearly each, of the nation's wars (see shaded areas of Chart 1). During and immediately following the Civil War, the debt rose from $64.7 million in 1860 to $2.2 billion in 1866, an increase of 3,350 percent. Never before had federal indebtedness come remotely close to $1 billion. As Chart 1 illustrates, the Civil War experience constituted a major change in the position of federal indebtedness. Additional imagery is provided by Chart 2A. The total indebtedness from 1791 to 1860 is shown in the shaded area. In the following six years the debt exploded. Thereafter, indebtedness tended to move downward, reaching a low of $581 million in 1892.

There was another major upsurge in federal indebtedness as a consequence of World War I. In 1916, prior to US entrance into hostilities, the federal debt stood at $973.6 million, having been cut nearly 60 percent below its Civil War peak. But during the next three years, the federal debt surged to $25.2 billion, an increase of nearly 2,400 percent (Chart 1). Here again, financial markets accommodated a major increase in quantities of debt issues by the US Treasury. Chart 2B suggests that the World War I experience was similar to experience during the Civil War. The accumulation of debt from 1791 to 1916 constituted only 2.4 percent of the 1919 debt level. After the war, there were substantial debt reductions. By 1930 the debt had fallen more than one-third, reaching $15.9 billion just prior to the Great Depression.

During the 1930s the debt expanded rapidly (at a 10.3 percent average annual rate), reaching $42.4 billion in 1940.

World War II was accompanied by a huge increase in the federal debt, if viewed within ordinary terms of reference. Roughly $230 billion were added to federal indebtedness from 1940 to 1946, more than a fivefold

Chart 2. Debt Accumulations

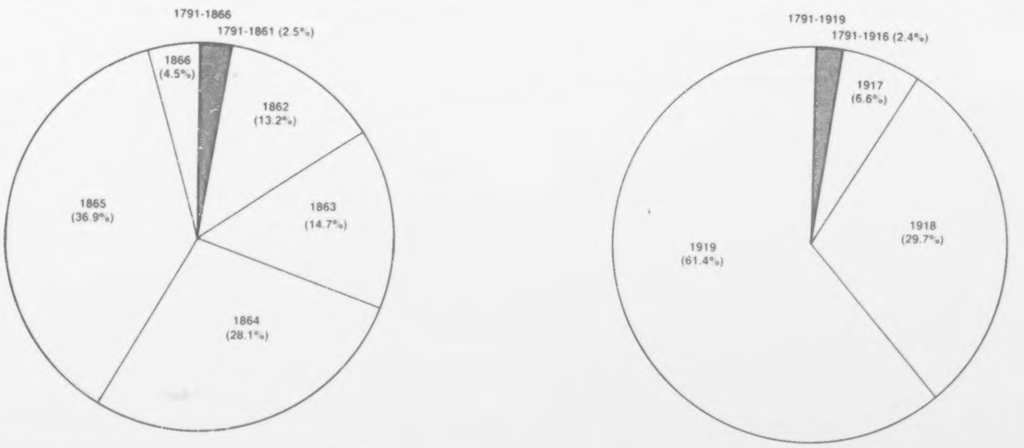


Chart 2A. Civil War

Chart 2B. World War I

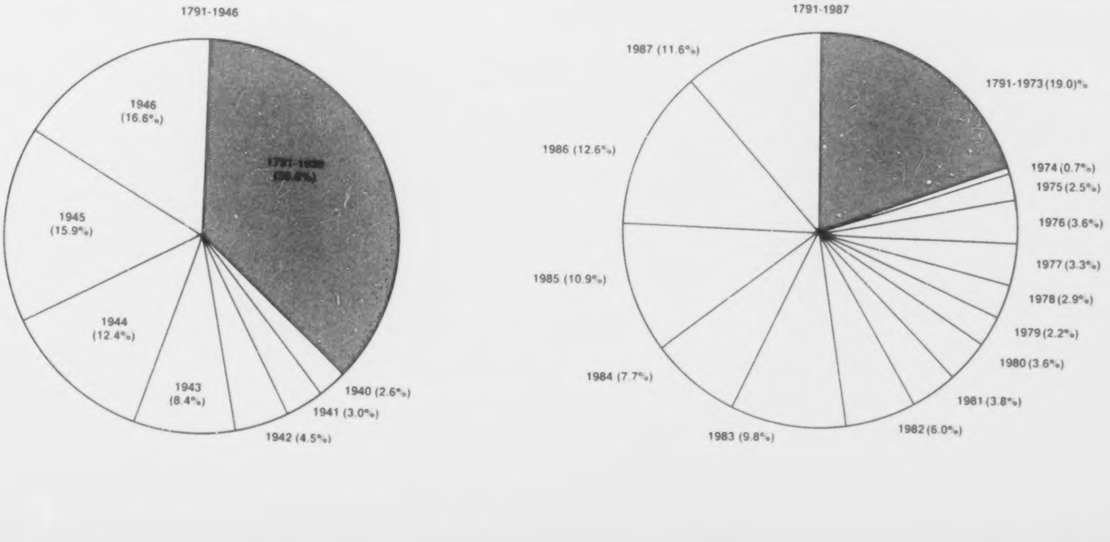


Chart 2C. World War II

Chart 2D. Since 1974

expansion. Thus, even though Chart 1 suggests that the increase was not as large as during the Civil War and World War I, it was substantially larger in dollar amounts.

The World War II experience again illustrates a persistent problem in interpreting the impact of change on, or within, a growing organization. Following World War II, it was possible to observe that the accumulation of debt during the preceding six years was massively in excess of the total indebtedness that had accumulated during the preceding 155 years of the nation's history. In fact, it was five times greater. Although such a statement has a dramatic impact, it is not really extraordinary, as indicated by comparing Chart 2C with 2A and 2B. Following World War I it could be said that the preceding three years had witnessed a growth in debt that was nearly 25 times greater than had been accumulated in the preceding 128 years of the nation's history. Following the Civil War, it could be said that the preceding six years had witnessed a growth in debt that was nearly 35 times greater than had been accumulated during the preceding 75 years of the nation's history.

Since the end of World War II, the federal debt has moved steadily upward, registering only five small reductions after 1946. The postwar period can be divided meaningfully into two subperiods. The first period consists of the 28 years from 1946 to 1974. In terms of absolute amounts, the federal debt rose from $268.1 billion to $532.1 billion, an average annual rate of increase of 2.48 percent.

The second period runs from 1974 to the present. The federal debt has expanded $1.9 trillion, having risen more than 400 percent (an annual rate of growth of 13.2 percent). As indicated, the accumulation of debt in the past 13 years has surpassed the debt increases of the preceding 183 years (Chart 2D).

For those interested in political comparisons, it turns out that the first seven years of the Reagan Administration have been impressive in terms of its ability to generate debt. Beginning with a debt of $996.5 billion at the end of fiscal 1981, the debt has more than doubled (see the table). In the four-year Carter Administration the debt rose by more than one-third, and in the Nixon-Ford Administrations the debt nearly doubled. The doubling period, the period of time required for anything to double (see insert), has shortened in each of the preceding three administrations. From 8.1 years in the Nixon-Ford Administrations, it fell to 7.8 years in the Carter Administration. In the Reagan Administration it has shortened to 5.6 years (see the table).

Experience during these administrations was markedly different from that in earlier administrations. At the rate of debt growth during the Eisenhower era, it would have taken 70 years for the debt to double. The doubling period was 26.7 years during the Kennedy-Johnson period (see the table).

Debt Growth during Presidential Administrations

Presidential Administrations	Outstanding Amounts* ($billions)	Debt Accumulation (percent)		Doubling Periods (years)
		Prior	During	
Eisenhower (1954–1961)	285.7	92.4	7.6	70.1
Kennedy-Johnson (1962–1969)	351.7	81.2	18.8	26.7
Nixon-Ford (1970–1977)	697.6	50.4	49.6	8.1
Carter (1978–1981)	996.5	70.0	30.0	7.8
Reagan (1982–1987)	2,372.0	42.0	58.0	5.6

*Outstanding amounts are as of the terminal year shown.

Rule of 70

The years required for any number to double can be approximated by dividing 70 by the rate of growth (treated as a whole number). For example, if there is a 10 percent rate of growth, the doubling period is approximately seven years (70/10 = 7); for a 5 percent rate of growth the doubling period is roughly 14 years (70/5 = 14).

The rule can be explained in at least two ways:

With continuous compounding:

$$2x = x e^{gn}$$
$$\ln 2 = gn$$
$$n = \ln 2/g;$$

where:

x = initial amount, $e \approx 2.7183$ g = growth rate, n = number of years, and ln = natural logarithm.

At a 10 percent rate of growth, the doubling period is 6.93 years (.69315/.1 = 6.931). At a 5 percent rate, the doubling period is 13.86 years (.69315/.05 = 13.8628).

With discrete annual compounding:

$$2x = x(1+g)^n$$
$$\ln 2 = n \ln(1+g)$$
$$n = \ln 2/\ln(1+g)$$

At a 10 percent rate of growth, the doubling period is 7.27 years (.69315/.09531 = 7.2725). At a 5 percent rate, the doubling period is 14.21 years (.69315/.04879 = 14.2067).

For many purposes, the Rule of 70 gives a useful approximation. If greater accuracy is required, the selection of procedure depends upon the nature of the growth process being considered.

Other Measures of the Size of the Debt

It is of interest to compare the debt with other relevant variables. There is a view that it is relevant to relate the size of the debt to total income. According to this view, the payment of interest on the debt and the ultimate repayment of principal depend upon the stream of income out of which that debt will be serviced. In applying this type of thinking to the consumer sector, it is common to relate outstanding consumer indebtedness to after-tax income or, alternatively, to personal income. In the matter at hand, two measures are represented. One measure of debt burden is provided by the relation between the federal debt and federal receipts. A second measure is the ratio of debt to gross national product (GNP).

Each measure tells the same story. The burden of the debt reached its peak during World War II, then drifted downward through much of the 1970s (see Chart 3). The debt burden has risen during the 1980s.

There are no magic numbers to indicate the point at which the burden of the debt begins to inhibit the economy. In World War II the size of the debt exceeded GNP by one-fifth and exceeded federal receipts by a multiple of six. For the bulk of the next four decades the debt burden declined. By 1980, the ratio of debt to GNP had fallen to less than one-third; the debt relative to federal receipts had declined to a multiple of 1.6 to 1.

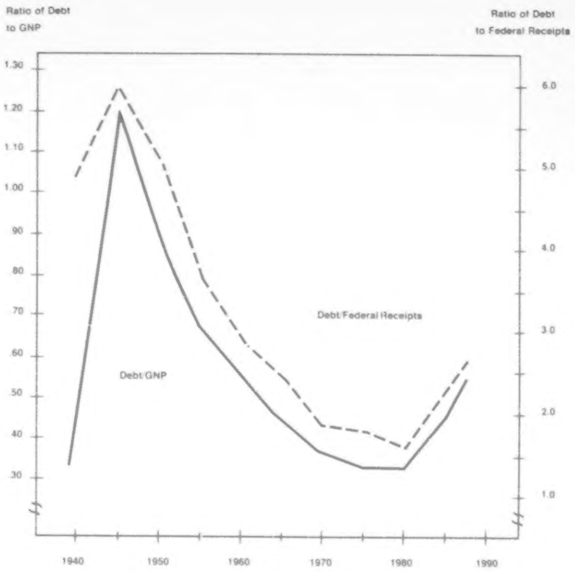
Concluding Remarks

The federal debt has risen more rapidly during the period since 1974 than during other peacetime periods of this century. It has expanded particularly rapidly since the early 1980s. An aspect of the accelerated growth in debt is that the doubling period has shortened markedly.

Even so, there is no reason to regard the decade of the 1980s as a disturbingly marked departure from the nation's history. There is every reasonable presumption that the recent and current growth in the federal debt will be accommodated into investor portfolios without difficulties. After all, there have been many episodes during which rapid debt accelerations have been handled without memorable strain. Moreover, although the burden of the debt has increased moderately during the 1980s, there is no reason to suppose that the current burden is uncomfortable.

Nor should we be distracted by observations to the effect that there has been an explosion in debt. We need not be concerned by the fact that some desirable, or undesirable, variable has doubled in the recent past. One of the troublesome concomitants of inflation is that there is an abundance of nonsmall rates of growth in magnitudes measured in dollars. As a consequence, doubling periods shorten substantially. Unless there is a return to rates of inflation that had characterized the 1950–1970 period, as the world unfolds over the next several decades we will again be in a position to look back and observe that the recent past has duplicated all of the nation's history. Such a state of affairs enables us to persist in the impression that the cutting edge of life experience through which we are moving is characterized by unprecedented change. It freshens the illusion that we are special. And in many ways it is always true.

Chart 3. Measures of Debt Burden



MONA J. GARDNER, HAN BIN KANG, AND DIXIE L. MILLS

Japan, USA: The Impact of the Diamond Star Plant on the Bloomington-Normal Economy and Housing Market

Recently, several Japanese corporations have elected to manufacture and/or assemble products in the United States. The impact of these decisions has been a subject of considerable interest, especially in view of the financial incentives many state and local governments have extended to the Japanese firms. An opportunity to study selected economic effects of what *Business Week* recently called the "Japan USA" phenomenon arose after April 1985, when Chrysler Corporation and Mitsubishi Motor Corporation jointly agreed to build an automobile plant in the United States. On 7 October 1985, Bloomington-Normal, Illinois was officially announced as the plant site for the new Diamond Star Motors.

Although Bloomington-Normal itself has enjoyed a relatively stable economy, much of Central Illinois has experienced high unemployment and declining growth in recent years. Many saw the Diamond Star plant as the beginning of an economic renaissance, and Chrysler and Mitsubishi officials actively promoted that belief. Initially, they announced that the plant would have a capacity of 180,000 cars annually, produced by 2,500 workers. Even before the groundbreaking ceremony in April 1986, the announced annual capacity was increased to 240,000 cars, to be produced by 2,900 workers. The plant has a projected cost of $700 million, of which $100 million are to be paid as wages during construction.

State and local government officials echoed the belief that the plant would be of significant economic benefit to the area. In fact, governmental units provided $88 million in financial incentives to Chrysler and Mitsubishi to lure the Diamond Star plant to Illinois. Such incentives included investment tax credits, state sales tax credits, income tax deductions, reductions in local tax obligations, reductions in filing and permit fees, and subsidies for land purchase and building demolition. The Diamond Star plant will receive these benefits for 10 years.

In response to charges by some taxpayers that the incentives were too generous, government officials justified their actions with consultants' projections that the new plant would result in substantial economic and financial development in the community and surrounding areas. Estimates of up to 8,500 new jobs, accompanied by increases in personal income, when the plant reaches full capacity have been widely quoted. Local officials stressed the "just-in-time" inventory-management practices of Japanese manufacturers and predicted that most suppliers for the plant would be located within a few miles of Bloomington-Normal.[1]

Measuring the Economic Impact

The purpose of our research was to begin analyzing trends in housing values, employment by sector, income, population, and other variables to determine whether the projected economic benefits of the Diamond Star plant have begun to be realized. The findings reported here are based on data spanning the period January 1982 through early 1987, representing two phases in Diamond Star history: a 3-1/2 year period *before* the Diamond Star announcement (1982 to late 1985) and the period following the announcement of the plant in which construction of the plant and hiring of workers began (late 1985 to early 1987). All conclusions drawn are preliminary, of course, because the full economic significance of the Chrysler-Mitsubishi investment will not be apparent for some time. The long-run research plan includes a comparison of economic conditions during the construction and initial operating stages (late 1985–1990) with the economic data gathered for the earlier period.

To assess the condition of the residential real estate market, monthly data on residential property sales and building permits were obtained. In addition, with the financial assistance of the Office of Real Estate Research at the University of Illinois and the cooperation of the Bloomington/Normal Board of Realtors, Multiple Listing Service (MLS) data on over 1,600 single-family home sales in the Diamond Star area were collected. To assess other economic conditions, data were gathered on unemployment rates, employment in manufacturing, construction, service and other nonagricultural jobs in both the public and private sectors, commercial bank deposits and loans, and state sales tax receipts.

An effort was made to control for external influences, such as changes in the state economy or other sources of growth or decline in the local economy. Unfortunately, of course, a clear separation of Diamond Star from other events is impossible. But reasonable control was accomplished by collecting data on another region for comparison. Thus, all comparable data were gathered for Champaign County, and most were also gathered for the state as a whole. The Champaign-Urbana area represents an excellent comparison to McLean County and Bloomington-Normal because of the similar size, location, and employment mix.

For each category of data, relative ratios and/or percentage changes over time were constructed. For example, McLean County construction employment was expressed as a percentage of total construction employment in the state of Illinois, and as a percentage of construction employment in the Champaign/Urbana area. The trend in each McLean County ratio before and after several key dates in Diamond Star history was examined to reveal whether any impact on the McLean County economy has yet been realized.

Findings

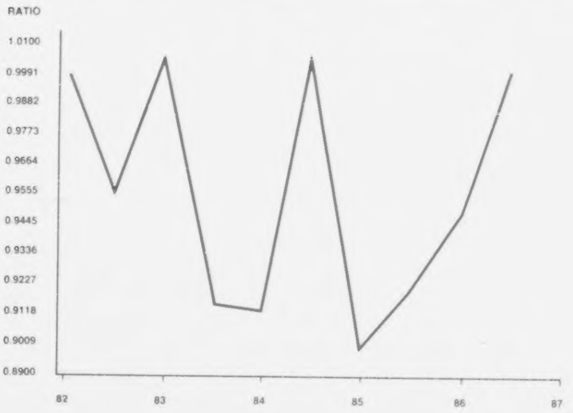
Results of the analyses are presented first for residential housing price indexes in Bloomington-Normal and Champaign-Urbana over the period 1982–1986, and then for other economic variables.

Residential Housing Prices

To assess conditions in the real estate market, a semi-annual housing price index for each area was constructed. The McLean County data consisted of a random sample of 1,619 single-family home sales reported in the annual sales book of the local Multiple Listing Service (MLS) during a five-year period from January 1982 to December 1986. The data for Champaign were drawn from house sales in the southwest quadrant of the city, with a total sample of 480 sales over the same five-year period.

The results of the regression analysis are illustrated in Chart 1. A comparison of housing price indexes for the two counties over the period 1982–1986 reveals that, although the relationship is unstable during the early part of the period, an upward trend began in the first half of 1985 and continued uninterrupted through year-end 1986. These results do not point to a definite conclusion that the new automobile plant has had a relatively positive impact on the Bloomington-Normal real estate market, although they are suggestive. The full impact of the Diamond Star plant on the local housing market will not be determined until the plant begins operating at full capacity in 1990.

Chart 1. Ratio of Housing Price Index (Bloomington over Champaign)

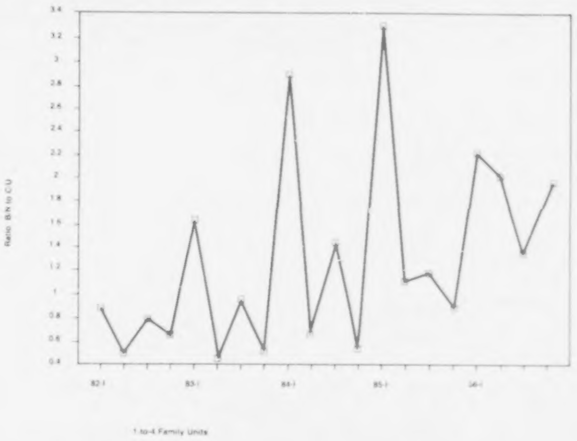


Other Economic Variables

Analyses of relative ratios and percentage changes for other economic variables suggest trends.

Building Permits. Chart 2 shows the ratio of quarterly totals for one-to-four family building permits in the Bloomington-Normal area to quarterly totals in the Champaign-Urbana area plotted over time. Over the period of study, the number of 1-to-4 family building permits issued in Bloomington-Normal relative to those issued in Champaign-Urbana increased. This strengthening in Bloomington-Normal building permits coincided with the upward trend found in Bloomington-Normal's relative housing price index. In contrast, the Bloomington-Normal ratio of permits for five-or-more family units, not shown here, did not increase, nor did quarterly *percentage changes* in building permits issued over the period.

Chart 2. Building Permits (quarterly totals)

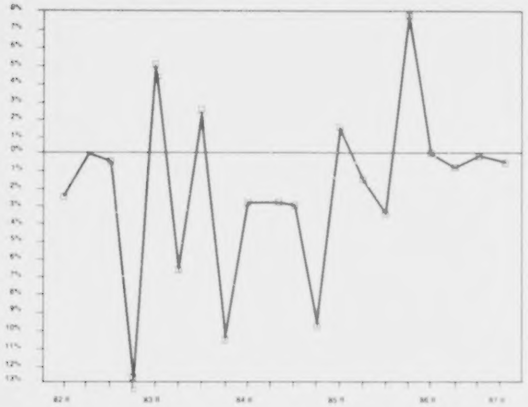


Employment by Sector. Because many of the economic benefits of the Diamond Star plant are projected to be the result of increased employment opportunities, considerable effort was devoted to analyzing employment by sector in Bloomington-Normal relative to that in the Champaign-Urbana and in the state of Illinois.

One would not expect large increases in manufacturing employment at this stage of the Diamond Star project, although increases in construction, wholesale, and retail employment might plausibly have already occurred as a result of plant construction. The ratios of construction jobs in Bloomington-Normal to those in Champaign-Urbana and to those in Illinois however, do not reveal any apparent changes following the Diamond Star announcement. A comparison of the difference in the quarterly rate of change in construction jobs between McLean County and Champaign County does indicate a slight upward trend in McLean County although the trend began before the Diamond Star announcement.

Wholesale employment in Bloomington-Normal declined considerably relative to that in Champaign-Urbana over the 1982–1986 period, and declined slightly compared to wholesale employment in the state of Illinois. Chart 3 shows, however, that quarterly percentage changes in wholesale jobs were greater in Bloomington-Normal toward the end of the period than in Champaign-Urbana. The upward trend begins in late 1985 and is consistent with the hypothesis that the Diamond Star construction has in fact stimulated business in the wholesale sector of the Bloomington-Normal economy. (Chart 3 plots the *difference* between Bloomington-Normal percentage changes and Champaign-Urbana percentage changes. Thus, values

Chart 3. Wholesale Jobs (quarterly percent change)



greater than 0 indicate greater rates of change in B/U than in Champaign-Urbana.)

Trends in retail employment are almost exactly opposite those in wholesale employment. While retail employment in Bloomington-Normal increased relative to that in Champaign-Urbana and in Illinois, the percentage changes were relatively lower in Bloomington-Normal following the Diamond Star announcement. The projected impact of the Diamond Star construction payroll had not translated into additional retail jobs by the end of 1986.

Unemployment. Although the Bloomington-Normal unemployment rate declined relative to Champaign-Urbana over the period 1982–1986, the decline does not coincide with the Diamond Star announcement. When compared to employment in the state, the Bloomington-Normal rate also declined slightly over the period. It is too early to tell, but late 1985 may have marked the beginning of a more pronounced decline in Bloomington-Normal's rate. This variable should be closely monitored in the future as the Diamond Star work force is brought up to full capacity.

Commercial Bank Data. Other economic variables that could potentially reveal economic changes as a result of the Diamond Star plant are total commercial bank deposits and IPC (individual, partnership, and corporate) deposits in McLean County, compared to those in Champaign County and in the state. Because data on personal income are not currently, and will probably never be, available, bank deposit data serve as reasonable proxies. Data for each six-month period from June 1982 to December 1986 indicate that both total and IPC deposits in the Diamond Star area declined over the period, despite the advent of plant construction in the latter periods.

Other banking data reveal a declining trend for total loans at commercial banks in McLean County versus those in Champaign County and in the state. After December 1985, however, the end of the six-month period in which the Diamond Star plant was announced, the declining trend in commercial and industrial loans compared to the Champaign-Urbana area was reversed. It is possible that this reversal reflects plans for business expansion and expectations of increased economic activity in the Diamond Star region following the plant announcement. Again, this variable should be monitored closely in subsequent periods.

Sales Tax Receipts. The final data set examined was quarterly sales tax receipts for McLean County and Champaign County from January 1983 through September 1986. To ensure comparability of tax rates over the entire period, amounts collected as a result of municipal or county taxes were omitted. The data shows an increasing trend in McLean County relative to Champaign County, although it appears to have begun before the third quarter of 1985 and, thus, may not be attributable to activities surrounding the Diamond Star plant.

Future Directions

Of course, a complete assessment of the financial impact of the Diamond Star joint venture compared to the incentives extended by governmental units must await completion and full operation of the plant. It also must include analysis of additional variables such as property tax data that are not yet available. Nonetheless, this study provided an important opportunity to examine several highly visible markets with potential impact on a large number of financial decision-makers. Ultimately, the results may have implications for state and local financial incentive plans, as well as for business people, home buyers, home sellers, real estate investors, the real estate industry, and financial institutions in affected communities.

At this point, the period following the Diamond Star announcement appears to be accompanied by increases in the prices of single family housing, one-to-four family unit building permits, wholesale employment, and commercial and industrial loans in the Bloomington-Normal/McLean County area relative to the Champaign-Urbana/Champaign County area. In addition, the rate of unemployment may be decreasing relative to that in the state of Illinois, and state sales tax receipts may be increasing relative to Champaign County, although these trends began before the Diamond Star announcement. However, it is too early to measure the full impact of the plant on any of these economic variables. This is particularly true because the real estate market is traditionally considered to have a relatively slow reaction to economic changes and to new information. It is hoped that collection and analysis of data can be continued at least through 1990.

Note

[1] Subsequent events have revealed that the "just-in-time" system in the United States may be implemented somewhat differently from the way it is practiced in

Japan. By the time the Diamond Star suppliers had been announced in mid-1987, only 10 of 50 were located in Illinois. Others were as far as 400 miles from Bloomington-Normal.

The authors are all faculty members in the Department of Finance, Illinois State University. This research was supported by a grant from the Office of Real Estate Research, University of Illinois at Urbana-Champaign.

MARTIN DWYER

Job Growth: A Look at Illinois and Its Counties

There is a view that Illinois has been lagging behind other states in its ability to increase employment in manufacturing or through attracting new business. With this in mind, it would be of interest to examine the recent history of Illinois employment. Such an examination may help to explain Illinois' lack of growth. In particular, it would be useful to identify the industries that have excelled in Illinois during this period, along with the regions that have grown most rapidly or deteriorated most drastically. It is also important to identify the factors that have been prominent in affecting the employment growth in particular regions.

The regional breakdown considered here involves separating the state of Illinois into counties. Once employment growth has been broken down to this regional level using the shift-share technique, factors contributing to each county's ability to increase employment are considered.

The first section presents a brief explanation of the shift-share technique. The second analyzes growth across certain manufacturing and service industries. The third examines the regional breakdown by county, setting forth a ranking of counties in terms of their "comparative advantage" in increasing employment. The fourth section identifies factors contributing to a county's comparative advantage. The analysis covers data spanning 1976–1983, sufficiently large to encompass a complete Illinois business cycle. Conclusions are presented in the final section.

The Shift-Share Technique

Shift-share analysis is a widely used technique by which employment gains or losses may be analyzed. Within the framework of this analysis, regional employment changes can be attributed to three distinct components. The first relates to the overall growth in the state; a second concerns differential growth rates across industries; and the third may be attributed to a unique set of characteristics possessed by that region. This third component of growth has come to be known as the region's "comparative advantage."

The shift-share technique can be illustrated by an example. Consider Peoria County located in Central Illinois. The breakdown of the employment gain for Peoria County from 1976 to 1983 is given in Table 1. Peoria County lost a total of 11,610 jobs due to its comparative (dis)advantage. However, the overall Illinois employment growth of 1.28 percent provided for an additional 1,360 jobs to be generated in the county. Manufacturing and services employment are shown in order to identify the amount of employment

Table 1. Breakdown of Job Gains (or Losses) for Peoria County (in thousands of jobs), 1976–1983

	Total Employment	Manufacturing Employment	Services Employment
Gain (or loss) due to:	–10.25	–8.47	3.26
Comparative advantage:	–11.61	–3.64	–3.68
Illinois growth:	1.36	0.29	0.33
Industrial mix:	0.00	–5.12	6.61

Table 2. Employment in Illinois (in thousands) by Major Industry and Shift Share Component, 1977–1982

Industry	Illinois Growth Effect	Industrial Mix Effect
Total manufacturing	16.1	–225.1
Food and kindred products	1.2	–17.1
Primary metals industries	1.1	–30.8
Fabricated metals industries	1.7	–28.6
Electronic equipment	1.9	–27.1
Transportation equipment	0.6	–11.2
Total services	13.8	169.2
Finance, insurance, and real estate	4.6	53.6
Agricultural services, forestry and fishery, etc	0.2	6.3

growth attributable to industrial mix in a particular region. In manufacturing, Peoria County lost a total of 8,470 jobs (of over 22 thousand in 1976). Only 3,640 jobs lost can be attributed to the environment for manufacturing in Peoria County itself (the county's comparative disadvantage in manufacturing). The remaining jobs lost in manufacturing can be attributed to the difficulties faced by the overall industry. For the service industries, Peoria County's comparative disadvantage would have called for a job loss of 3,680 jobs, only partially offsetting the overall growth of the service sector that would have provided 6,610 new jobs for the county.

A Shift-Share Look at Manufacturing and Services

The largest losses in Illinois employment in manufacturing from 1977 to 1982 were in the primary and fabricated metals industries. These industries showed a total loss of over 59,000 jobs (see Table 2), indicating that Illinois manufacturers face the same struggle as other American steel manufacturers. Thus, part of the employment loss in Illinois is attributable to an overall national trend away from production in this industry. Similarly, the heavy equipment industry in Illinois has faced major setbacks in the past from foreign competitors entering the domestic market. These developments result in the extremely large negative values on the industry mix, indicating that there would have been an employment loss in each industry in the absence of growth in the overall Illinois economy.

The difficulties in manufacturing were exacerbated in 1984–1985, as the dollar strengthened against foreign currencies. During that period, imports further strengthened and exports weakened.

The data for service industries in Illinois show strong growth. The service sector grew at a rate many times that of the overall Illinois economy, providing 169,000 jobs beyond those created as a result of growth in the Illinois economy. In the fast-growing finance, insurance, and real-estate industries, there was growth of 58,200 jobs. Of those, 53,600 can be attributed to factors other than the general growth of the Illinois economy. In the agricultural services industry only 200 of 6,500 jobs can be attributed to Illinois economic growth.

The service sector grew by 16.6 percent in Illinois compared with a 21.5 percent growth nationwide. Thus, even though the service industries in Illinois were expansive, their growth lagged behind the US figures. The manufacturing industry declined 2.5 percent nationwide, while slipping 16.2 percent in Illinois. In short, the weak industries have declined even more rapidly in Illinois than in the nation as a whole.

Rating the Counties by Comparative Advantage

The ranking of counties by various measures of comparative advantage appears in Table 3. The rankings of counties are by overall comparative advantage, comparative advantage in the manufacturing sector, and comparative advantage in the service sector. Overall comparative advantage is given by the county's ability to increase employment above the gain that would have resulted from growth in the Illinois economy. In making comparisons across counties, it is helpful to shift the analysis to a per capita basis. To accomplish this, the comparative advantage for each county is divided by the county's population, creating a measure of per capita employment gain.

No clear regional pattern emerges from the top five ranked by total comparative advantage. Three of the leading five are from metropolitan areas, while two are not. Of those counties from metropolitan areas, one is from the St. Louis area while the others are from the Chicago area (McHenry and DuPage). Four of the top five performers—McHenry, Monroe, Wabash, and Dupage—were among the top five in the rankings for the service industry. The remaining top ranking for the service industry, Schuyler County, had a ranking of only 41 in manufacturing.

Of the bottom five performers as ranked by per capita comparative advantage, there are two from metropolitan areas (Tazewell and Kendall). Alexander and Mason counties, two of the bottom five, had no service industry employment at all. In addition, Tazewell and Knox Counties were also among the bottom five in the rankings for the manufacturing industry.

Factors Contributing to Comparative Advantage

There are five potential contributors to comparative advantage: (1) labor skill, (2) public policy environment, (3) local infrastructure, (4) local market strength, and (5) local transportation and utilities environment. Using a statistical technique called regression analysis, can shed light on which of these variables has influenced employment growth during the period since 1976.

Table 3. County Ranking by Comparative Advantage (per 1,000 people), 1976–1983

County	Total	Services	Manufacturing
DuPage	1	1	10
DeWitt	2	97	26
Wabash	3	3	35
Monroe	4	4	37
McHenry	5	5	4
Lawrence	6	83	29
Lake	7	7	25
Wayne	8	59	30
Clinton	9	56	48
Edwards	10	36	1
McLean	11	44	55
White	12	33	77
Marion	13	24	7
Saline	14	14	59
Clay	15	8	62
Jackson	16	31	43
Franklin	17	43	36
Jefferson	18	45	3
Effingham	19	67	11
Kane	20	30	31
Coles	21	32	19
Champaign	22	11	24
Lee	23	94	9
JoDavies	24	37	60
Grundy	25	21	65
Stephens	26	55	8
Johnson	27	26	72
Schuyler	28	2	41
Sangamon	29	18	82
Richland	30	12	100
Macoupin	31	68	32
Will	32	13	71
St. Clair	33	61	51
Livingston	34	48	5
Putnam	35	10	6
DeKalb	36	9	40
Randolph	37	35	13
Washington	38	69	66
Morgan	39	46	23
Winnebago	40	15	42
Perry	41	40	95
Greene	42	54	50
Bureau	43	33	16
Williams	44	20	57
Cass	45	100	12
Crawford	46	52	16
Logan	47	27	78
Hancock	48	57	20
Boone	49	70	2
Madison	50	25	88
Shelby	51	19	45
Marshall	52	22	21
Cook	53	58	64
Pope	54	91	102
Cumberland	55	98	15
Iroquois	56	47	58
Clark	57	39	22
Mercer	58	53	47
Fayette	59	79	39
Carroll	60	16	18
Stark	61	6	14
Jersey	62	85	80
Moultrie	63	73	74
Brown	64	101	61
Piatt	65	88	28
Bond	66	89	44
Christian	67	99	85
Scott	68	28	52
McDonough	69	75	49
Henderson	70	42	56
Calhoun	71	65	53
Adams	72	86	38
Kankakee	73	63	90
Warren	74	82	34
Menard	75	80	76
Hamilton	76	17	84
Montgomery	77	51	54
Douglas	78	96	27
Woodford	79	84	46
Henry	80	77	87
Jasper	81	64	73
Macon	82	76	68
LaSalle	83	62	97
Ford	84	23	75
Ogle	85	70	81
Vermillion	86	72	83
Gallitin	87	41	67
Edgar	88	74	79
Pulaski	89	90	63
Massac	90	92	70
Pike	91	60	68
Peoria	92	87	91
Rock Island	93	78	92
Fulton	94	38	98
Hardin	95	95	33
Union	96	49	86
Whiteside	97	81	93
Mason	98	93	94
Alexander	99	101	96
Kendall	100	66	89
Knox	101	50	99
Tazewell	102	29	101

The skill level of the labor force, not a readily available statistic, can be approximated in two different ways. The first is the proportion of the population over age 25 with at least 12 years of education. There is a presumption that labor skill levels rise with the level of education. The data for this variable came from the 1980 Census. The second way to approximate skill level is per capita expenditure on education. Presumably, higher levels of per capita expenditure on education would lead to increases in the skill level of workers.

In either case, the impact of the skill level of labor on employment growth depends largely on the type of industry in the area. If the industrial mix requires a great deal of skilled labor, one would expect a strong positive relationship between skill level and employment growth. In contrast, if the industrial mix requires only unskilled labor, it is unlikely that an increase in the skill level would enhance employment.

To summarize the quality of the public policy environment, two measures are used. The first is per capita taxes collected at the local level; the second is per capita direct local government expenditure in the county. Theory regarding, and empirical work on, the impact of taxes on employment growth are unclear. On its face, a tax serves as a drain on the economy. However, to the extent that taxes are a prerequisite to expenditures, they can also represent a positive influence.

Two measures are used to summarize the infrastructure of the counties. The first indicates growth for those counties located in a metropolitan area. A county is considered to be in a metropolitan area if it is located in an area defined as a standard metropolitan statistical area (SMSA). It is expected that there are economic advantages to location in a metropolitan area arising by virtue of an extensive industrial base. For example, a metropolitan county such as DuPage County would already have developed an extensive sanitation system, janitorial services, and even consulting services. Such services would be unavailable in counties such as Schuyler County in Central Illinois. The second approximation used for local infrastructure is the proportion of the county population employed in the agricultural sector. Because much of agricultural production is exported, employment in that sector is tied closely to national and international activity. Agricultural activity would be expected to offset losses in a county due to weakness in other industries.

Local market strength, or purchasing power, is measured by per capita personal income. Because a higher level of per capita personal income in an area would mean that the average consumer had a larger purchasing power, it is expected that an increase in a county's per capita personal income in 1976 would attract producers to lucrative markets, causing production and employment in the area to rise.

As the transportation and utilities expenses become higher in a given region. They are expected to act as a deterrent to production and, therefore, job growth. As a measure of transportation and utilities expense, the per capita transportation and utilities earnings is used.

Results of the Analysis

The analysis was carried out at a number of levels. First, all 102 counties were considered as a whole. Because this type of analysis might overshadow the differences between those counties with a comparative advantage and those with a comparative disadvantage, these two groups of counties were analyzed separately. The analysis was also extended to identify the factors contributing to a county's comparative advantage in services and manufacturing.

For the analysis of all counties grouped together, the findings are consistent with hypotheses relating to skill level and government policy.

However, the results of the analysis are not statistically significant. For the analysis of the counties as a total group, the results concerning factors contributing to service sector comparative advantage are more conclusive than those for total comparative advantage. Results relating to the skill level are statistically significant.The findings show that a 10 percent increase in this factor leads to an increase of 5.8 jobs in the service sector per 1,000 people in each county. In manufacturing, results relating to skill level and employment growth do not show an acceptable level of statistical significance.

Significant results emerge in the analysis separately carried out for manufacturing. Contrary to previous suggestions, the relationship between per capita direct government expenditure and manufacturing employment growth is found to be negative (and statistically significant).

Also, there was statistically significant difference in manufacturing employment growth between those counties in SMSAs and those that are not. If the county was in a SMSA, it could be expected to lose eight more jobs (per 100 people) than in the non-SMSA counties. The additional losses reflect the comparative disadvantage in manufacturing.

In order to extract additional information about job growth in Illinois, the counties with above-average performance were analyzed separately. In terms of total comparative advantage for these counties, per capita personal income was found to have a statistically significant positive influence on employment growth. A $10 increase in per capita personal income was found to lead to an increase of 20 jobs per 1,000 of population. Such results are consistent with the view that a county's purchasing power is positively related to its overall employment growth. In terms of service sector comparative advantage for these counties, the most striking result was a statistically significant positive relationship between per capita direct government expenditure and job growth. An increase of $10 in this factor was found to lead to an increase of one job for every 2,500 people in the service sector. A significant relationship was also found between service sector comparative advantage and the labor skill level. Such results are consistent with those found in the overall analysis. The infrastructure, as measured by the per capita farm employment, was found to be a statistically significant positive influence on employment growth. The positive influence of per capita farm employment is due to the fact that the agricultural sector grew nationwide at a rate faster than did the overall economy of the state.

In terms of manufacturing employment growth for those counties with a comparative advantage, the negative relationship between job growth and government expenditure was again found. There was also a statistically significant relationship between manufacturing job growth and per capita personal income. As was the case with services, in manufacturing there was a strong negative relationship between job growth and location in a SMSA. Location in an SMSA was associated with a loss of an additional 20 jobs per 100 people, compared with non-SMSA counties.

Among those counties at a comparative disadvantage, the attempts to estimate factors influencing employment growth were unsuccessful. Although the influences of factors follow the patterns indicated earlier, the only significant results are those relating to per capita personal income and per capita farm employment. Both factors exert positive influences comparable to those discussed earlier. It is expected that the counties with a comparative disadvantage have been subject to individual problems, less systematic and, therefore, less explainable by the analysis used here.

Conclusions

Employment growth in Illinois is substantially slower than in most other states. The present study presents a ranking of Illinois counties in terms of their economic performance. The measures used to rank the counties here were based on examining the employment growth in a county due to a set of characteristics unique to that county. The results of the analysis indicate that differences among Illinois counties in employment growth rates relate to such factors as labor skill level, local purchasing power, and per capita government expenditure.

Illinois Business Indexes

The underlying strength of the Illinois economy is uncertain. As shown in Chart 1, the current indicator rose above the trend indicator in August, but resumed its downward path in September. The current indicator is an average of the composite leading indicator series for the past three months. The trend indicator is the average of the composite leading indicator for the past six months. When the three month average is below the six month average, it indicates that the leading indicator series is experiencing a downward movement. Movement is considered meaningful if it lasts for four or more months.

Of the 11 components of the composite leading indicator series, five are illustrated in Charts 2 through 6. Vendor performance (Chart 2) measures the percent of businesses reporting late deliveries. As the economy moves towards full capacity, suppliers find it increasingly difficult to make timely deliveries. An upward moving trend, therefore, would indicate the economy is moving towards full capacity. As illustrated in Chart 2, there has been an upward trend since February. Real Illinois sales tax receipts and real Illinois personal income tax receipts are proxies for real retail sales and real personal income respectively. As shown in Charts 3 and 4, both these components have remained fairly stable for the past year. Total nonagricultural employment (Chart 5) fell in September after increasing for the previous five months. Housing permits issued (Chart 6) also continued its general decline.

These series do not include October. Hence, they do not reflect the economic uncertainty that has followed the stock market crash. The future direction of the Illinois economy greatly depends upon the health of the national economy. If the national economy moves into a recessionary phase, the Illinois economy will follow.

ILLINOIS BUSINESS INDEXES

	Percent Change Sept 1986-Sept 1987	*Sept 1987*	*Aug 1987*	*July 1987*	*June 1987*	*Sept 1986*	*Aug 1986*
Leading Indicator (Current Indicator)	3.05[a]	10.49	11.68	10.38	11.49	7.44	6.49
Leading Indicator (Trend Indicator)	3.38[a]	10.92	11.06	11.19	12.55	7.54	5.92
Employment-manufacturing (in thousands)[b]	0.93	933.6	932.6	930.3	929	925.0	922.8
Average weekly hours-manufacturing[b]	-0.24	41.5	41.6	41.6	41.8	41.6	41.1
Weekly earnings-manufacturing[b]	0.97	$450.69	$453.44	$453.02	$454.78	$446.37	$440.59
Help wanted advertising-Chicago (1969 = 100)[c]	13.86	115	120	120	120	101	100
Help wanted advertising-St. Louis (1969 = 100)[c]	0.00	62	66	64	68	62	64
Retail Sales (in millions)[d]	-6.34	$5,450	$6,071	$5,953	$6,163	$5,819	$5,819
Coal production (in thousands of tons)	5.48	5,542	5,226	4,088	4,979	5,254	5,225
Petroleum products (in thousands of barrels)[b]	-13.11	1,875	1,810	2,030	1,980	2,158	2,017
Vendor performance[e]	32.69	69%	60%	62%	57%	52%	51%
Building permits (in thousands)							
Residential housing units	-44.29	3.065	4.616	4.474	5.101	5.502	4.326
Value of Residential housing	-8.00	$330,352	$318,192	$342,356	$391,383	$359,088	$296,180
Value of nonresidential construction							
Industrial buildings	-30.33	$32,512	$30,566	$17,697	$26,543	$46,663	$20,324
Office, banks, and professional buildings	167.87	$67,922	$33,539	$41,298	$66,837	$25,356	$80,030
Stores and other mercantile buildings	18.62	$51,157	$34,784	$50,338	$36,555	$43,128	$38,029
Other	11.76	$4,524	$8,677	$8,567	$7,542	$4,048	$3,276
Consumer price index (December 1977 = 100)							
North Central US[f]	4.43	184.8	184.0	182.6	182.4	—	176.2
North Central/population more than 1,200,000[f]	4.15	189.2	188.2	186.9	186.6	—	180.7
North Central/population 360,000 to 1,200,000[f]	5.51	182.4	182.0	180.2	180.2	—	172.5
North Central/population 50,000 to 360,000[f]	4.91	180.8	179.6	178.2	177.8	—	171.2
North Central/population less than 50,000[f]	3.33	176.7	177.1	176.7	176.1	—	171.4
Chicago (1967 = 100)	4.79	349.9	348.8	346.1	345.0	333.9	331.4
St. Louis (1967 = 100)	4.24	339.5	—	334.7	—	325.7	—
		1987:II	1987:I	1986:IV	1986:III	1986:II	1986:I
Personal income (in millions)[b,g,h]	4.83	$188,293	$187,233	$180,304	$179,096	$179,622	$174,013
Per capita personal income[b,g,h]	7.56	$16,165	$16,099	$15,527	$15,445	$15,029	$15,051

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, 19 September. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Percent change between Aug 1986 and Aug 1987. [g] Seasonally adjusted at annual rates. [h] Percent change between 1986:2 and 1987:2.

Chart 1. Composite Leading Indicator (Average Percent Change in Base Indexes)

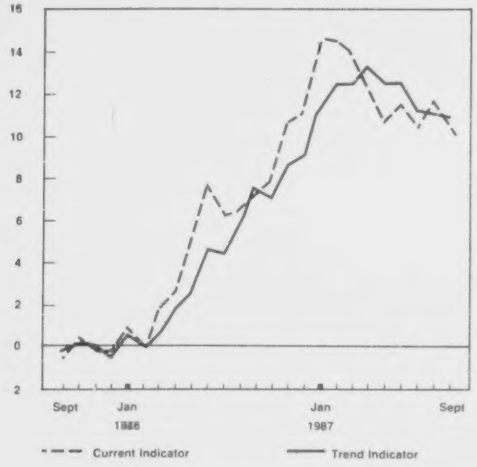


Chart 2. Vendor Performance (Seasonally Adjusted)

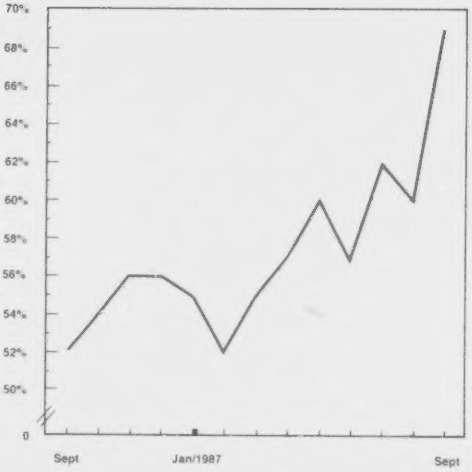


Chart 3. Real Illinois Sales Tax Receipts (Seasonally Adjusted)

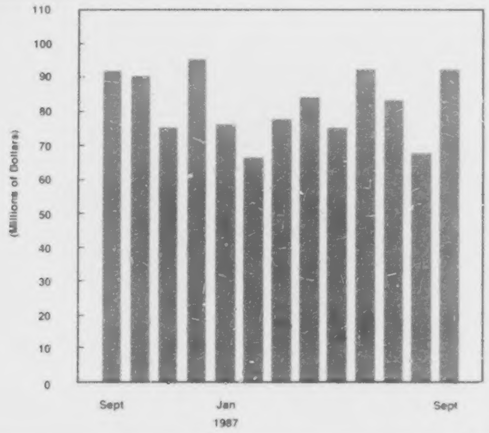


Chart 4. Real Illinois Income Tax Receipts (Seasonally Adjusted)

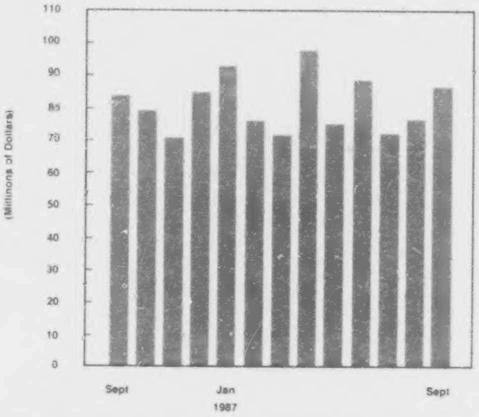


Chart 5. Total Nonagricultural Employment (Seasonally Adjusted)

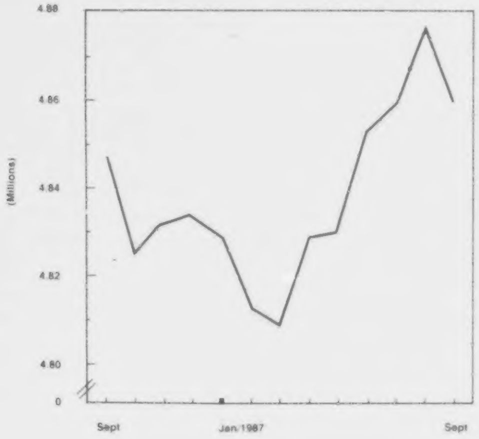
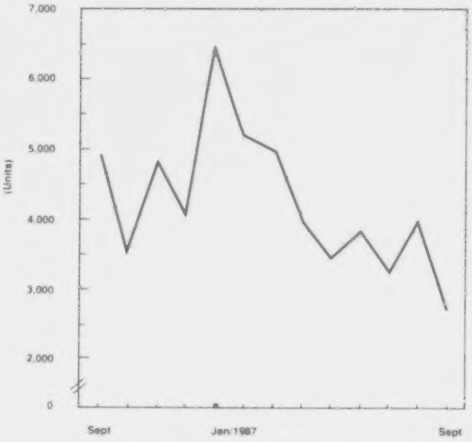


Chart 6. Housing Permits (Seasonally Adjusted)



Second-class postage paid at Urbana, Illinois

Illinois Business Review

Bureau of Economic and Business R
428 Commerce West, 1206 South Si
Champaign, Illinois 61820

CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

Illinois Economic Outlook

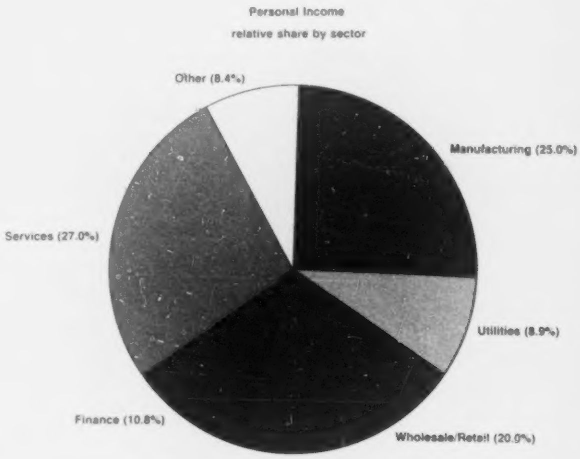
Illinois Personal Income (Seasonally Adjusted)

	History				Forecast			
	1986:III	1986:IV	1987:I	1987:II	1987:III	1987:IV	1988:I	1988:II
Total personal income (in millions)	$179,096	$180,309	$184,404	$187,203	$191,098	$194,254	$197,969	$201,568
Private nonfarm	114,936	116,236	118,020	119,101	120,981	122,471	124,377	126,259
Mining	1,146	1,140	1,141	1,211	1,235	1,252	1,269	1,282
Construction	8,128	8,230	8,255	8,067	8,146	8,223	8,279	8,329
Manufacturing	28,786	28,983	29,500	29,731	30,023	30,380	30,700	31,021
Durable manufacturing	18,022	18,076	18,164	18,334	18,430	18,617	18,772	18,934
Nondurable manufacturing	10,764	10,907	11,336	11,397	11,593	11,762	11,928	12,087
Utilities and transportation	10,216	10,250	10,475	10,740	10,780	10,807	10,898	10,991
Wholesale and retail trade	23,034	23,306	23,548	24,022	24,435	24,845	25,258	25,644
Finance, insurance and real estate	12,196	12,500	12,756	12,912	13,229	13,328	13,609	13,911
Services	30,935	31,334	31,836	32,419	33,132	33,635	34,363	35,081

Bureau of Economic and Business Research

Total personal income will grow 4.78 percent in 1987 and 6.85 percent in 1988 according to a forecast of the Illinois Econometric Model. Real personal income is also expected to increase, although at much more modest rates due to anticipated increases in the price level. The expansion in income is the result of steady growth in each sector of the Illinois economy as indicated by the table. During 1987 the fastest growing areas are the financial, service, and the wholesale and retail trade sectors, with increases of 9.2 percent, 5.56 percent, and 4.68 percent, respectively. Similar rates of growth are also expected in 1988. Because these areas account for over 50 percent of private, nonfarm income, growth of this kind has the most impact on the overall economy (see the chart).

Personal Income (relative share by sector)



3/8/88 U6910-1

February 1988
Volume 45, Number 1

Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana/Champaign

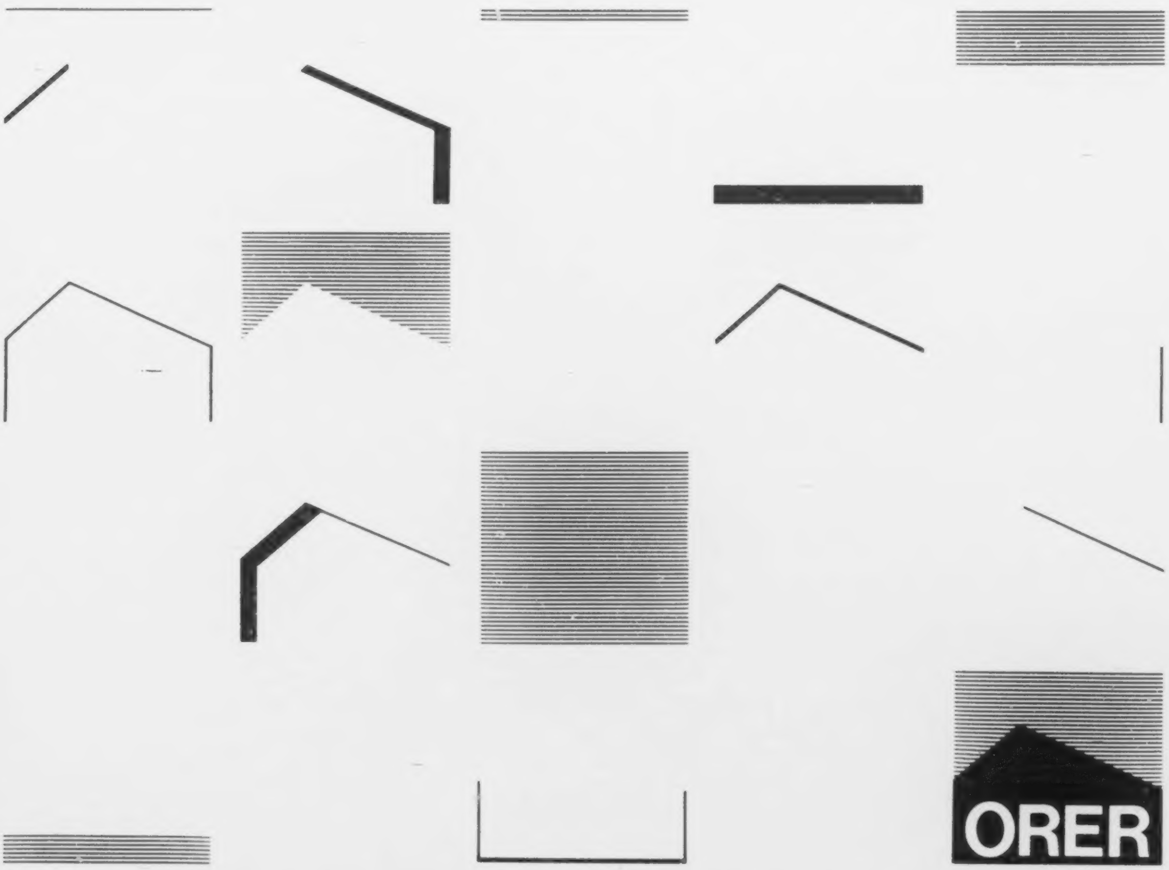
ORER 1987 / 2

The Economic Theory of Eminent Domain / 6

Effective Salesperson Selection via Profiling / 9

Real Estate Tax Assessment Uniformity in Illinois / 12

Construction Activity in Illinois 1972–1987 / 15



February 1988
Illinois
Business
Review
Volume 45 Number 1

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Director, Robert W. Resek; *Acting Director,* Marvin Frankel; *Editor,* William R. Bryan; *Technical Editor,* Janet R. Fitch; *Designers,* Ronald Sterkel, Rajene Fry, and Kimberly Nyberg; *Research Assistants,* Paul C. Bishop, Gregory A. Gilbert, Martin Dwyer, Mary A. Laschober, and Anne E. Winkler; *Director of the Office of Real Estate Research,* James R. Follain.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide businessmen of the state and other interested persons with current information on business conditions.
Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.
The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois.

Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

JAMES R. FOLLAIN

ORER 1987

Real estate markets have become increasingly complex in recent years. Some of the reasons for this trend include the changing taxation of real estate, the securitization of real estate for sale to investors, new methods of real estate finance, and the ever present problem of developing sound governmental policies for the housing market. One consequence of the trend is an increase in the demand for personnel with expertise in real estate finance and economics; indeed, students have responded to this demand by enrolling in real estate courses in record numbers. Another consequence is the demand for research about real estate markets, especially research that makes use of the tools of modern finance and economics. The State of Illinois responded to these changes in 1980 by establishing the Office of Real Estate Research (ORER), a unit within the College of Commerce and Business Administration at the University of Illinois, Urbana-Champaign (UIUC). The Illinois Association of Realtors® and the Real Estate Education Fund of Illinois (REEF) played a major role in the establishment of ORER.

The objective of ORER is to maintain an ongoing real estate research and education program centered at the UIUC campus. UIUC was chosen because of its preeminent position among public universities within the state and its long and excellent tradition in the field of real estate. Real estate courses have been offered within the College of Commerce and Business Administration at UIUC since 1955.

In some previous years, ORER has produced a booklet describing its purpose and activities. A different approach is used this year to convey some of the exciting developments at ORER: an issue of the *Illinois Business Review* devoted entirely to real estate. This introductory article reviews the structure of ORER and reports on its activities during 1987. The four articles that follow are specific research papers that provide a good flavor of the kind of work ORER supports. We hope you like it.

Structure of ORER

ORER is led by the Director, James R. Follain, a Professor in the Finance Department. The director reports to Associate Dean for Academic Affairs of the College of Commerce and Business Administration, Jane Leuthold. In addition he works closely with the ORER Advisory Committee. The members of the 1987 ORER Advisory Committee include:

William R. Bryan, Chair of the Department of Finance at UIUC.

Gary Clayton, Executive Vice President, Illinois

Association of Realtors®.

Peter Colwell, ORER Professor of Real Estate and Professor of Finance at UIUC

Robert E. Cook of Cook-Witter, Inc.

Lydia Franz, Koenig & Strey Realtors.

John Hamer, President, Hamer Holding Group.

Charles Hill, Executive Vice President, Federal Home Loan Bank of Chicago.

Jane Leuthold, Associate Dean of the College of Commerce and Business Administration, UIUC.

Terry Lutes, Illinois Association of Realtors®.

David Rittmiller, Sales Associate, Traders Realty Corp. and President of the Real Estate Education Foundation.

Ronald See, State of Illinois Real Estate Commissioner.

Several UIUC faculty are affiliated with ORER.

Jan K. Brueckner, Professor of Economics
Roger E. Cannaday, Associate Professor of Finance
Peter F. Colwell, ORER Professor
Philip J. Rushing, Adjunct Professor of Finance
Carl Webber, Adjunct Professor of Finance

ORER also employs several research assistants.

The principal financial support for ORER comes from the state's Real Estate Research and Education Fund (REREF). Revenues to REREF have been around $175,000 per year. These come from two sources: interest from the Real Estate Recovery Fund (roughly two-thirds of the revenue) and fees for real estate broker and salesperson licenses ($4 per new license or reinstatement). Revenues can vary depending upon interest rates and the number of new licensees.

ORER expenditures can be divided into three main categories: personnel, research dissemination, and research awards. Personnel expenditures include compensation for the director, the ORER Professor, the ORER secretary, and research assistants. Research dissemination expenditures include the cost of producing and distributing research papers and outlays for various seminars offered. Research awards to UIUC faculty and to other scholars, both in Illinois and around the nation comprise the remaining portion of the budget. The outlook for future budgets is discussed later in this article.

Research in 1987

The primary activity of ORER is research, especially research that analyzes the economic and financial aspects of real estate markets. Much of the research is done by academics and is ultimately published in academic and professional journals. However, a substantial effort is made to produce papers for the wider audience of real estate professionals within Illinois.

There are two main outlets for ORER research. The first is the ORER Paper Series begun in 1985. Since the inception of the series, 54 papers have been produced. Papers for 1987 include:

#41 "A Note on REITs: A Contingent Claim Analysis" by Hun Y. Park and Philip J. Rushing.
#42 "Assumption Financing: Theory and An Empirical Test" by Mark A. Sunderman, Roger E. Cannaday, and Peter F. Colwell.
#43 "Do Prices Reflect Market Fundamentals in Real Estate Markets?" by Louis O. Scott
#44 "Occupational Change and Sex Integration in Real Estate Sales Occupations" by Barbara J. Thomas and Barbara F. Reskin.
#45 "Intrajurisdictional Tax/Benefit Capitalization: Neighborhood Effects" by Kalman Goldberg and Robert C. Scott.
#46 "Understanding the Real Estate Provisions of Tax Reform: Motivation and Impact" by James R. Follain, Patric Hendershott, and David C. Ling.
#47 "Notre Dame Avenue Apartments" by Philip J. Rushing.
#48 "Hedging Commercial Adjustable Rate Mortgages with Treasury Bond Put Options" by Richard Garrigan and Carl Luft.
#49 "Improving the Odds: Effective Salesperson Selection Via Profiling" by Mary Coveny.
#50 "The Experience of the US Secondary Mortgage Market: Born in a Regulated Environment but Flourishing in a Competitive One" by James R. Follain.
#51 "The Economics of Shopping Centers: A Literature Survey" by Kangoh Lee.
#52 "Why Do Home Ownership Rates Vary among Metropolitan Areas?" by Dixie M. Blackley and James R. Follain.
#53 "Residential Investment and Mortgage Markets" by Yoon Dokko, Robert Edelstein, and E. Scott Urdang.
#54 "Japan, USA: The Impact of the Diamond Star Plant on the Bloomington-Normal Economy and Housing Market" by Mona J. Gardner, Han Bin Kang, and Dixie L. Mills.

The second major outlet for research results is the *Illinois Business Review*, which publishes an article contributed by ORER in each issue. Most are produced as the result of ORER research awards and, as summaries of longer papers, are designed to be nontechnical presentations of interest to a wide audience within the real estate industry. ORER publications can be obtained by writing to the Office of Real Estate Research.

As noted earlier, ORER regularly awards research grants to academics and other researchers. Proposals are reviewed three times a year, in September, January, and May. Typical awards are about $5,000. Further information regarding proposals can be obtained by writing to the Director.

Highlights of 1987

Several new programs, projects, and changes occurred in 1987. This section highlights some of them.

ORER Letter.

ORER is always seeking new ways to inform the real estate community of the research being conducted. A new venture was launched this year to aid in this endeavor. The first of a series of *ORER Letters* was published in October. This eight-page publication contains a summary of an ORER research paper, an interview with Carl Webber, a new faculty member, and a variety of information about ORER and its research activities. We intend to produce several issues per year. Those wishing to be on the mailing list should write to the ORER secretary.

Gifts to ORER

Sheldon Good of Sheldon Good and Company in Chicago joined the UI Foundation's President's Council in November 1987 and designated that his $10,000 gift be used by the Office of Real Estate Research. Sheldon Good graduated from the real estate program at UIUC in 1955 and is best known for his innovations in the area of real estate auctions. Indeed, *Fortune* featured his firm in the 12 October 1987 issue.

ORER also received a $5,000 gift from the Rosenberg Real Estate Equity Fund (REEF) in December 1987. REEF is one of the largest and most respected real estate investment firms in the country. Its clients include large pension funds who desire to include real estate in their portfolios. REEF also provides a $5,000 Fellowship for graduate students interested in real estate.

Other gifts in 1987 were received from Dr. and Mrs. A. Van Tienhoven in honor of Mr. and Mrs. C. B. Younger and from Robert Levin of Wolin-Levin, Inc.

Alumni Luncheons

Two luncheons for UIUC alumni in the field of real estate were held in Chicago, one in April and one in November. At the Spring meeting, Sheldon Good spoke about real estate auctions, and Donald Rundblom, class of 1975, of Morgan Stanley in New York spoke at the Fall luncheon about Commercial Mortgage-Backed Securities. We plan to have two luncheons in 1988. Further information on luncheons and the real estate alumni mailing list should be directed to ORER.

Course Curriculum

The student demand for real estate courses remains strong. In addition to two survey courses, one at the undergraduate and one at the graduate level, courses are offered in the areas of appraisal, investment, finance, urban economics, and law. Typical enrollment in these upper-level courses is 30 or more. The University offers a B.S., M.S., and Ph.D. degrees in finance with a concentration in real estate.

Rho Epsilon and Job Candidates

Professor Roger Cannaday and the members of the Rho Epsilon Fraternity—an organization of students interested in real estate—have developed a brochure that contains biographical information about students soon to graduate. Most of these students have had several real estate courses. The majority of students will graduate in May with a B.S. in finance with a concentration in real estate, although a substantial number will be receiving an M.S. in finance or an MBA. The brochure is available upon request from ORER.

New Offices for ORER

Faculty and staff affiliated with ORER moved to a new suite of offices in 304 David Kinley Hall in August. The suite includes offices for the director, the ORER secretary, and Professors Cannaday, Colwell, Rushing, and Webber. In addition, a conference room is available. Previously, faculty associated with ORER were located throughout David Kinley Hall and Commerce West.

The new arrangement clearly identifies ORER to other faculty and, especially, to students. We are very excited about the change.

Award to Robert E. Cook

One of the people most responsible for the establishment of ORER is Robert E. Cook, currently president of Cook-Witter, Inc. Bob Cook initiated the movement to establish ORER while he was the Executive Vice President of the Illinois Association of Realtors® in the late 1970s. He served on the ORER Advisory Committee from its inception until October 1987. On 30 October 1987, Dean John Hogan of The College of Commerce and Business Administration presented Bob with a plaque in appreciation of his outstanding service to ORER.

Strategic Planning Process

The major highlight of 1987 was the Strategic Planning Conference held at the Allerton Conference Center on 20 and 21 August 1987. The conference was attended by the ORER Faculty, the Advisory Committee, and several invited guests, including Richard Arnould, Professor of Economics at UIUC; Terry Hendrickson, Vice President, Ticor Title Insurance; Ralph Martin, President, William L. Kunkel & Co.; Chester Moskel, President of the Home Builders Association of Greater Chicago; Jack Seymour, Savings and Loan Commissioner for the State of Illinois; George Shapland, owner, Flo-Con Corporation; Arlen Speckman, President, Speckman & Co.; and Howard Thomas, James Towey Distinguished Professor of Business Administration at UIUC. Professor Thomas served as the Strategic Planning Coordinator for the conference.

The purpose of the meeting was to assess the accomplishments of ORER during its first eight years of operation and to lay the foundation for its future development. One product of the process is a strategic planning document, which will soon be available. What follows is a summary of the most important questions raised during the process and the consensus of the people involved.

Real Estate as a Profession Is Changing. Is ORER in the Proper Niche?

The real estate profession is becoming more and more sophisticated; furthermore, it is a very heterogeneous profession encompassing the fields of finance, economics, planning, marketing, architecture, psychology, and many more. ORER has focused upon the economic and financial aspects of real estate and its approach has been rather academic and theoretical. Is this the proper approach? Should a broader approach be taken or should it continue to build upon the strength of the UIUC faculty?

The consensus of the conference is that ORER should continue to do what it does best, which is to produce high quality research that focuses upon the economic and financial aspects of real estate markets. However, a much greater effort must be made to market ORER's products. The effort should include improved advertising and packaging of the various publications. Also essential is an increase in the percentage of papers that have direct relevance to real estate professionals.

Real Estate as a Field of University Study Is Changing. Should the UIUC Real Estate Program Change?

Many colleges and universities have responded to the increased demand for real estate courses by introducing real estate curricula. Some are in business schools, like UIUC, but many others are in urban planning departments and architecture schools. Indeed, several schools have introduced programs that encompass more than one college; for example, MIT has an M.S. Program in Real Estate Development in which students take courses in economics, finance, management, marketing, planning, architecture, and engineering. Should UIUC take this route or should it continue to focus on the economic and financial aspects of real estate?

UIUC is one of the few universities in the country that can provide a comprehensive real estate education because of its strength in the major disciplines relevant to real estate. Currently, however, students are merely encouraged to choose courses from the different colleges and departments. A long-range plan should include the possibility of introducing a formal interdisciplinary program in real estate. However, there are other, more pressing, short-run needs given the growth in the demand for training in the economic and financial aspects of real estate. Furthermore, many of the conference participants feel that teaching something as amorphous as "real estate development" is likely to be very difficult. Thus, the consensus was reached to maintain and improve upon the existing program while we continue to give thought to an interdisciplinary program. Also, a concentration in real estate for the MBA Program is being considered.

The ORER Budget Is Such that Our Base of Support Must Be Expanded if It Is to Continue to Grow. How Should This Be Done?

Historically, $25,000 to $50,000 has been available to support outside research awards. Unfortunately, the 1987–1988 budget has little discretionary money available to support new ORER Research Awards. The main reason is that revenues have remained relatively constant while expenses have continued to grow. Unless new sources of support are found, the research agenda will have to be cut and become increasingly dependent upon the interests and expertise of the immediate ORER staff.

All conferees agreed that the base of support for ORER should be enlarged. Specifically, it was suggested that the ORER Advisory Committee be expanded to include a wider range of real estate professionals. In addition, the support of other associations and large corporations will be solicited. It is hoped that added representation on the ORER Advisory Committee will bring increased awareness of ORER activities and thereby lead to additional financial support. Efforts are already underway to implement this stage of the plan.

Final Thoughts

1987 was an exciting year for ORER. We have seen once again how the academic and business communities can work together to produce valuable research and outstanding students. In 1988 we hope to build upon the momentum and ideas generated by the recent Strategic Planning process. Decisions will be made regarding new research directions, the size and composition of the Advisory Committee, and efforts to obtain additional financial support. As always, we are interested in the advice and opinions of the professionals within the Illinois real estate community, especially our alumni.

The Office of Real Estate Research (ORER) encourages all interested persons to contact the ORER office:

**Office of Real Estate Research
304 David Kinley Hall
1407 West Gregory Drive
Urbana, Illinois 61801**

with any questions or comments about this article or any article in this issue or to obtain copies of working papers, *ORER Letters*, the Rho Epsilon bulletin of upcoming graduates, or information on research awards through ORER or the Alumni Luncheons and alumni mailing list. ORER welcomes any questions, comments, or suggestions regarding the Office and its programs.

THOMAS S. ULEN

The Economic Theory of Eminent Domain

One of the guiding tenets of the law of real property is that an individual property owner is entitled to do whatever he chooses with his property so long as he does not unduly interfere with a like liberty of other property owners. Among other things, this allows the private owner to sell or give his property to whomever he chooses and, just as important, *not* to sell. There are, however, restrictions on this entitlement: for example, the government, using its power to "take" private property (also called its eminent domain or condemnation power), may legitimately compel individual owners to sell all or a part of their property to the government.

In this article I summarize an economic theory of the governmental eminent domain or "taking" power and use that theory to evaluate several recent court cases on the public use of private property. The point I wish to make is that the application of the theory would lead to the more efficient use of real property by both private owners and the government and that, to the extent that the courts have not been applying the theory, real property is being less efficiently used.

An Economic Theory of Governmental Taking

Let me develop the economic theory of takings by dealing with four related questions. First, what inefficiencies might this power impose and are there any potential offsetting efficiencies? Second, what restrictions might be imposed on the government's taking power in order to confine its use to circumstances in which the benefits exceed the costs? Specifically, consider the restrictions imposed on the federal government by the Fifth Amendment of the Constitution and on state governments by the Fourteenth Amendment: the government may take private property only if the taking is for a public use and the private owner is *justly compensated* (that is, he is given the objective or fair market value of his property). Third, what is the relationship between the taking power and the governmental power to regulate the use of private property? And finally, what incentives does compensation for taking create for private investment in and governmental use of real property?

Question 1: What Are The Potential Inefficiencies of Taking?

One of the largest potential inefficiencies of allowing the government to compel a sale of private property is that the forced sale may move the property from a higher-valued to a lower-valued use. This almost never happens in a voluntary sale of property: people exchange property only when it is worth more to the buyer than to the seller at the agreed-upon price. Suppose that Samson owns real property that his ancestors have occupied for longer than anyone can remember. He has, naturally, a great sentimental attachment to the land and, therefore, places a very high valuation on it, say, $1,000,000. But suppose further that the *objective* or *fair market* value of the property is much less, say, $500,000, based, perhaps, on the land's prospects as a commercial or residential development. Finally, suppose that the government desires to put Samson's property to a public use and can compel Samson to sell his property to it at fair market value. Presumably, the government has determined that the public use of the property is worth more than its fair market value, so from its point of view the transaction with Samson is value-enhancing. But from Samson's point of view, the compulsory sale is a disaster: he loses $500,000 of value. The compulsory sale has moved the property to a lower-valued use.

The inefficiency of the example is, of course, due to the interpretation of "just compensation" as being fair market value and to the discrepancy between objective or fair market value and subjective or idiosyncratic value. This possibility for an inefficient taking could be minimized by interpreting "just compensation" to mean the minimum price the owner is willing to accept for his property. In essence, this would make governmental purchases of private property indistinguishable from any other voluntary transaction. But there is an additional difficulty. If the government must pay a private owner's minimally acceptable selling price, then once the government has announced an intent to take, the private owner has a strong incentive to exaggerate the amount she will accept.

Question 2: Are There Potential Efficiencies from Governmental Taking?

These considerations lead to the question of whether there might be some potential social efficiencies or benefits from allowing the government to take private property for public use at fair market value. These efficiencies are most likely to arise if the government is engaged in purchasing private property in order to supply what economists call a "public good." Those are goods, such as fireworks displays and national defense, that private firms are not likely to provide because of the difficulties in getting those who consume public goods to reveal their willingness to pay for them. Typically, the government provides these goods or subsidizes private suppliers and forces consumers to pay for them through compulsory taxation. There are some public goods that are so large and complex, for example, interstate highways and a superconducting supercollider that is 53 miles in circumference, that they simply must be provided by the government. For these large and complex public goods, the social efficiencies from providing them might be so great that society should incur the potential inefficiencies of allowing the government to take private property at fair market value in order to provide them.

Question 3: Do the Public Use and Just Compensation Constraints on Taking Lead to Efficiency?

This brings us to the question of whether the imposition of the public use and just compensation restrictions confines the government's taking power to those circumstances in which the efficiencies or benefits of the taking exceed the inefficiencies or costs. The answer is that they *do* if those restrictions are interpreted as follows: "just compensation" must be interpreted to mean objective or fair market value, and "public use" or "public purpose" must be interpreted to mean governmental provision of a large, complex public good.

Question 4: What Incentives Does Compensation for Taking Create for Private Owners and Governmental Officials?

Frequently the government undertakes to affect the use of real property not by taking possession but rather by regulating its use. Why? Because the government is not obligated to compensate loss in value that occurs through legitimate regulation of public health, welfare, and morals. Whatever their social benefits, these regulations typically lead to a reduction in the value of the regulated property, prompting the private owners to contend that the regulation has gone so far as to amount to a taking of their property. The private owners sue the government (in what is called an "inverse condemnation" action) to have the regulation declared a taking so that the government will have to pay them the fair market value of their property. For its part, the government contends, first, that the regulation is an attempt to pursue a legitimate government regulatory aim and, second, that the reduction in value is not substantial enough to constitute a taking.

Whether regulations are usually or rarely interpreted as takings has important effects on the actions of both private owners and government officials. If the courts routinely treat regulations that lower property values, by however little, as takings requiring compensation of the private owner, then the government becomes, in essence, an insurer against loss in private property values arising from government action. This may induce private owners to make excessive investment in real property and its improvements and government officials to become wary of issuing regulations, thereby lessening the public good they might do. On the other hand, if the courts routinely interpret loss in private property values, however large, due to governmental action as noncompensable regulation, then private owners may become reluctant to invest in real property and improvements, and governmental officials may become overzealous regulators of private property rights.

The solution to this paradox of compensation for governmental taking and regulation is a taxation or option-purchase scheme between the government and private owners that is too complex to cover here and that has little chance of being implemented. (For a fuller discussion of these option and taxation plans, see Robert D. Cooter and Thomas S. Ulen, *Law and Economics* Glenview, IL: Scott, Foresman, 1988.) Instead, as we shall see, the courts seek a balance between the inefficient extremes noted above, sometimes veering more toward one extreme, sometimes towards the other.

Theory in Practice: Recent Developments in Takings

The tension between the rights of the private property owner and the public use of his property regularly appears in actions before state supreme courts and the United States Supreme Court. One important recent trend has been a weakening of the public-use constraint on the governmental taking power. While the courts never enunciated the efficient definition of public use suggested above, there was nonetheless a widespread consensus that taking should be confined to such clearly public goods as irrigation, drainage, reclamation of wetlands, highways, and the like. But the broad trend recently in the taking field has been judicial deference toward legislative judgment as to public use. Consider, for example, *Poletown Neighborhood Council v. City of Detroit*, a case that came to the Michigan Supreme Court in 1981. In 1980 the General Motors Corporation informed the City of Detroit that it intended to close its Cadillac plant and to move to the Sunbelt unless the City provided extensive improvements to the freeways, streets, and sewers around the plant. Fearing the loss of 6,000 jobs and much corporate income tax revenue, the city took private property around the site and turned it over to GM at a price far below its market value. The property taken was in a closely knit ethnic community for many of whose residents there was a subjective valuation on residence far above the fair market value of their homes. A majority of the court held that the retention of the jobs and of the corporate income tax revenues was a valid public use. The court should have considered whether it might not have been better to void the taking in order to induce the city to find some other method of helping GM that would have spread the costs over a broader base.

In *Hawaii v. Midkiff* (1984) the United States Supreme Court also undertook to broaden the notion of public use. The issue turned on an action by the Hawaii state legislature to distribute land ownership rights more broadly. Because of Hawaii's early monarchy and feudal land tenure, land ownership rights in the state were concentrated in a few hands: the state and federal government owned 49 percent of the land in Hawaii, and another 47 percent was in the hands of 72 private landowners. In the Hawaii Land Reform Act of 1967, the legislature allowed current lessees of land to employ the Hawaii Housing Authority to take the land they rented in exchange for paying fair market value to the owners. Midkiff protested that this amounted to compelling the sale of private property not for public use but for *private* use. The Court held that the Hawaii state legislature's purpose of more broadly distributing land ownership was a valid public purpose for compelling the sale of private property.

The cumulative impact of these decisions is that it is now difficult to imagine a government-mandated purchase of private property, including those for resale to another private individual, that does not satisfy the public use restriction. This is bound to have adverse consequences on the efficient use of private property and on the incentives created for the regulation and use of private property by governmental officials.

I want to be careful to note that I am *not* saying that the ends sought in the *Poletown* and *Midkiff* cases are not legitimate governmental ends. Indeed, they are. I am, instead, making the claim that the compulsory sale of private property may not have been the best or most efficient way to accomplish those ends.

At the end of its last term, the United States Supreme Court handed down three important decisions having to do with whether certain governmental regulations amounted to the taking of private property. The cases are important because they signal a turn away from the broadening trend of the public use cases and a move toward the more efficient balance between public and private use of property suggested by the economic theory.

The issue in *Keystone Bituminous Coal Association v. DeBenedictis* was whether a Pennsylvania act prohibiting coal mining that might cause subsidence damage to preexisting buildings, dwellings, and cemeteries effected a taking of private property of coal mine owners. The owners contended that by requiring them to leave 50 percent of the coal beneath threatened structures, the regulation so lowered the value of their subsurface rights as to amount to a taking. The Court held that the Act was a legitimate regulation of public safety and that the loss of property value was not large enough to convert the regulation into a taking, principally because the Act affected only 2 percent of the total holdings of the coal mine owners' association.

A different issue was at the heart of *First Evangelical Lutheran Church of Glendale v. County of Los Angeles.* The church had purchased land outside the City of Los Angeles in 1957 to operate as a camp for handicapped children and as a church retreat. In 1978 a flood destroyed the camp's buildings, and in response the County of Los Angeles adopted an ordinance prohibiting the construction or repair of any building in a flood protection area, which included the church's property. The Church contended that this regulation denied it any use of its property and, therefore, amounted to a compensable taking. In the meantime the County rescinded the ordinance so that the issue became whether the church was entitled to compensation for temporary loss of its property caused by a regulation. The Supreme Court held for the first time that the ordinance, though temporary, had been a compensable taking.

Finally, *Nollan v. California Coastal Commission* delivered one of the most important recent statements on the relationship between private and public use of property. The Nollans owned property along the coast, including the beachfront. On either side of their land was a public beach. Because the Nollans owned the beachfront, no one could pass between the public beaches without trespassing on their private property. The Nollans applied to the California Coastal Commission for permission to build a much larger house on their property. The Commission granted the permit on the condition that the Nollans allow the public an easement across their beachfront. The Nollans brought an action contending that the easement in exchange for the building permit was a regulation that amounted to a compensable taking. The Supreme Court held that if the condition, the easement, had furthered the same legitimate regulatory purpose advanced by the building permit, then it, too, would have been legitimate. Thus, for example, if the Nollans' new home would have blocked the public's view of the beach from the public highway, then the Commission might legitimately have extracted from the Nollans an easement from the highway to the beach in order to allow the public to view the Nollans' beach. But the easement was not for that purpose; rather it was to allow easier access across the Nollans' property for users of the public beaches, something completely independent of the building permit. In the Court's view this was not closely enough related to the detriment caused by the new home. The Commission still remained free to advance its program of public use of the California coast by exercising its eminent domain power and paying for access easements.

Conclusion

The economic analysis of governmental taking offers a justification and an interpretation of the public use and just compensation restrictions on the public use of private property that preserves an efficient balance between the private and public use of property. Until recently, state and federal courts had defined public use and just compensation in ways that could be defended using the efficiency analysis. But lately courts have allowed virtually anything to count as a legitimate public use and have begun to broaden the notion of noncompensable regulation. These trends inevitably lead to the less efficient use of real property.

However, in the three key cases I discussed above—*Keystone Bituminous Coal Association v. DeBenedictis, First Evangelical Lutheran Church of Glendale v. County of Los Angeles,* and *Nollan v. California Coastal Commission*—the United States Supreme Court has begun to redraw the line between noncompensable regulation and compensable taking much more favorably to the private owner and much less favorably to the government. The result should be a more efficient balance between the private and public use of property.

Thomas S. Ulen is an associate professor of economics at the University of Illinois at Urbana-Champaign.

MARY COVENY

Improving the Odds: Effective Salesperson Selection via Profiling

Is the high attrition rate among real estate salespeople a fact of life or are there ways to refine the selection process? Can we lock or at least slow the "revolving door"? Losses of 30 to 50 percent of new salespeople during their first two years are the norm.

This article reports my study on the use of personality profiles to develop information that would help the broker choosing salespeople. I found that top producers among a group of suburban Chicagoland residential salespeople are easily identified, through personality profiling, by the extent to which they are self-starters, self-motivated, and self-sufficient. One profile performed three times more effectively than the estimated current industry practices. At the same time, background factors fail to give any clues to which salesperson would be a high-volume producer or to what group a broker might target career marketing efforts.

The Costs of Turnover

It is relatively easy to underestimate the expense to brokers of sales personnel attrition in recruiting expenses (ads, printing, postage), career seminars, prelicensing rebates, training, and staff time. More difficult to measure is business opportunity lost when a new or unproductive Realtor-Associate fails to convert incoming responses to signs or ads into sales. The salesperson who might have chosen another career has lost the salary from that job and has experienced ego damage and feelings of failure. Morale within the sales office drops as well.

Respect for brokerage services, the perceived status and desirability of a real estate career, and the image of professionalism are indirect casualties of high turnover. These factors are likely contributors to real estate companies' inability to attract strong candidates. Klimosky and Childs (1981) found that, of individuals enrolling in an Ohio real estate prelicensing class, those with a high sales drive most often chose other careers. They suggest that the real estate industry competes with blue collar and clerical positions for available job seekers. It may be that the best candidates are selecting themselves out because of the problems mentioned previously.

Factors in the Use of Profiling

In deciding whether or not to make a profile part of the sales selection process, one needs to know whether it offers an effectiveness rate higher than current procedures. A profile should not be judged against a standard of error-free prediction, according to Klimoski (1978), "but against the error-rate currently found in the organization. To say that a test is not useful because it is wrong 35 percent of the time is not a fair criticism if current selection procedures are wrong 50 percent of the time."

Klimosky and Sackett (1978) suggest determining a "base rate" for a firm—that "percent of the work force which at present is viewed by management as successful." This rate is determined by the attrition rate for new salespeople and on the number of salespeople remaining who earn a living wage. For example, in 1984, 41.8 percent of this country's licensed salespeople who responded to a National Association of Realtors®, survey earned a $20,000 annual income, which might be considered the minimum necessary to retain a career-minded individual. One third or more of all new salespeople leave in the first 12 months. Of the remaining 67 percent, 41.8 percent earn $20,000 or more per year. The base rate is 28 percent (.67 x .418 = .28). This is a conservative (optimistic) estimate of an National Association of Realtors® base rate because a third of the total membership turns over each year, and attrition is likely to be higher for first year people.

How does the broker evaluate the effectiveness of a given profile? Comparisons are difficult because not all profiles are validated on a sample of sufficient size, or that sample was not exclusively from real estate sales. There is a reluctance on the part of those marketing profiles to provide what they consider proprietary confirmation. When information is available, it is often couched in highly technical terms; and the broker may be at a loss to know how to evaluate it. In addition, some have had experiences with bad profiles, clumsy interpretations, or have personally been the victims of predication errors. The user manual for a profile commonly used in the insurance industry only claims to be 35 percent effective. A coin toss may be preferable to a bad profile.

Data and Methodology

The purpose here is to study the ability of profiling, either through personality profiling or by sketching an image of the successful associate's background, to predict performance. In addition, the study would offer data on the effectiveness of personality profiling from a source independent of the test publishers.

The approach was one of concurrent, not predictive, validation to eliminate the wait for a new salesperson to become established. For that reason, these results should not be read as a recommendation for or against either as a selection tool. This sample included only those with at least 12 months' experience. Profiles are designed to be used on a predictive basis, at the initial interview. The effectiveness of each of the profiles used with this group may differ when that same profile is used, as intended, at the selection interview.

Only those profiles costing less than $100 were considered because the likelihood of widespread use of more expensive ones by brokers was doubtful. The first personality measure, the Personal Orientation Profile (P.O.P.) has been validated by its developer on Canadian real estate salespersons.[1] Specific validity and reliability information was not available from the publisher, who did report that the P.O.P. was able to predict production levels with 80 to 88 percent accuracy when used at the initial interview. The P.O.P. was also recommended by the brokers who use it for is ability to identify specific training and development as well as supervisory needs. Also, potential problem areas are identified and questions are suggested for use in a second interview. Finally, the P.O.P. outlines the retention considerations specific and unique to each individual.

The second profile, the Personal Evaluation Program (P.E.P.),[2] reduced turnover of management trainees 56 percent in another industry. Both instruments showed considerable promise and have received good references from brokers who have used them.

In addition, a questionnaire was developed based on previous Ohio research. It was intended to determine whether or not those factors that predicted the establishment of real estate career were also related to production levels. No attempt was made to include those factors, like age and gender, that had not been shown to be highly significant by previous research and would not be helpful in making certain types of selection decisions. For example, Follain, Lutes, and Meier (1986) said that 52 percent of Illinois Realtor-Associates are female and their average age is 47. This kind of information is important in that it tells us that men and women can earn equally and that individuals of ages 22 or 82 are statistically under-represented compared to those in their thirties, forties, and fifties; it does not guide the broker who is interviewing two men, one aged 39 and the other aged 56. Should both, either, or neither be selected?

Because training, management philosophy, commission split, bonus incentive programs, and working atmosphere all influence productivity, the impact of these factors should be relatively consistent within a single firm. The subjects in the study were all residential real estate salespersons affiliated with First United Realtors as independent contractors during the calendar year 1984. They came from a variety of socioeconomic areas in the western and northwest suburban Chicago area with average 1984 sales prices in the communities ranging from $54,100 to $149,600. Attrition due to a lack of training was expected to be minimal because the firm provided 50–60 hours training by branch managers and 100 hours of classroom training. After the study began, Follain, Lutes, and Meier (1986) identified firm size and firm type as determinants of sales volume: an individual's income increased approximately one percent for each person in the firm's work force, and those salespersons who worked for a financial conglomerate or franchise tended to earn slightly less. An independent firm such as First United Realtors, which then had 400 salespersons, should maximize opportunities for earnings and the potential handicap imposed by the negative aspects of firm size and type should be minimal in this group of subjects.

All salespersons were ranked by production and the entire group divided into four equal parts. Thirty salespersons were randomly drawn from the top-producing 25 percent or quartile, 30 from the lowest-producing quartile, and 15 each from the second and third quartiles. Personal data was kept strictly confidential, and participation was voluntary. Using volunteers always introduces a certain amount of bias because there is no way to determine if the people who agreed to participate were in some way different from those who declined.

The typical salesperson worked 43.5 hours a week, had seven years experience, owned only one property when their real estate sales career began, and had a net worth of over $186,000.

The conventional wisdom is that 20 percent of the Realtor-Associates sell 80 percent of all property. The findings here are that about one third, instead of 20 percent, were the truly productive; the distribution of units sold in 1984 is quite positively skewed with about two-thirds of the subjects selling 20 or fewer units and one-third selling from 20 to 50 plus. A unit was defined as either a listing or a sale. It became apparent that a far clearer picture emerges using the top and bottom thirds instead of the originally planned 25 percent or quartile groups.

The entire distribution of scores was examined via a regression analysis to determine which of the many factors were related to performance. Because two-thirds of the scores fell between one and twenty units, a discriminant analysis was also used to compare only the upper and lower thirds. The discriminate analysis is less sensitive to distortion from the skewed or uneven distribution of sales.

Results of the Analysis

We expected to find a connection between production and initiation as demonstrated by community involvement, part-time work, or extracurricular activities in school, and perhaps a history of self-supporting at an early age. It also seemed likely that the factors, like net worth and realistic expectations, which were related to establishing a career, also predisposed a salesperson to a higher production levels.

In fact, much of what we expected to find was not evident in this sample. Items that failed to predict sales success included experience, prior type and hours of work, number of moves and transfers, present community organization involvement, part-time work and/or extracurricular activities in high school and college, other family members in real estate sales, age first self-supporting, work missed due to illness, and household income. There was no apparent correlation with financial expectations or realistic information at the time the sales career began, importance of the first sales manager, or financial versus family, social, and personal priorities. The importance of career choice factors such as low entry costs, increased income, autonomy, and minimal preparation were evenly distributed across the production groups and also failed to predict income or sales.

The report from top producers that they experience less fatigue than others is consistent with the long work week reported by those same top producers. They also saw a "flexible schedule" as less important in choosing a real estate career than others saw it. The pressures of working long hours may have caused them to abandon the notion of a flexible schedule or it may genuinely have been of less importance from the beginning.

We sought factors evident at the beginning of sales career that might show a connection with a longer work week in real estate, but found more. Hours worked in a previous job were unrelated to hours worked in real estate. Perhaps someone whose personality and temperament are well-suited to sales may be quite willing to put in the hours necessary for top production.

The Personal Orientation Profile proved remarkably effective in predicting each salesperson's performance level at the time of the study. Both the P.O.P.'s predictor score and the predicted performance level show an extremely strong correlation with productivity.

A correlation or relationship was also shown between productivity and five individual P.O.P. scales. The strongest of these is a highly significant correlation between productivity and enterprising potential, defined as "the degree to which an individual is a self-starter, self-sufficient, and self-motivated as these qualities pertain to accomplishing job goals. This scale identifies the type of training and development required by new hires."

A significant negative correlation is shown between commissions earned and people orientation; top producers were less likely than others to find "personal satisfaction in polite chit-chat." The first of two potential explanations is that, by the end of a long day filled with many hours of conversation and problem-solving, top producers are simply "peopled out." A second possibility is that top producers are more intensively task-oriented than others. They may enjoy conversation on a topic of personal interest or one that will result in a new prospect, but care little for small talk.

A slight negative correlation is shown between top production levels and the P.O.P.'s investigation scale, defined as "the degree of personal satisfaction derived from facts, figures, details and analytic activities." Top salespeople may be very competent in these areas, but may tend to lack interest in detail-intensive activities. This confirms the conventional wisdom, but the correlation here is only a slight one.

With this particular group of existing salespersons, the total score of the second profile, the Personal Evaluation Program, did not perform at a statistically significant level—although three scales showed slight correlations.

Error Frequencies		Predicted	Group	
		Low	High	
Actual Group	Low	17	5	22
	High	7	22	29
		24	27	51

Average accuracy of classification = 76 percent

From the data a formula was devised that allowed the rank ordering of this group of salespeople according to their sales volume. The formula was 76 percent accurate and could be used to predict the number of sales with the same degree of accuracy. Profiling appears to be a route worth further exploration.

Personality profiling is intended to supplement, not replace, the manager's experience and judgment; no profile should be more than 30–35 percent of the selection decision. It is not intended to substitute for in-depth interviewing and careful reference-checking. It offers no assessment of communication skills nor indication of presentable grooming. In one way, this makes a 76 percent accuracy level all the more remarkable.

The question "do you get more or less tired than others performing the same activity?" cannot be asked directly without the applicant guessing the desired answer. A possible alternative might to "tell me about a typical day." The response must then be ranked by the interviewer.

Conclusions

The most important findings are that (1) high producers are clearly identifiable via personality profiling; (2) top producers are self-starters, self-sufficient, and self-motivated and are less easily fatigued than others; and (3) interview questions about background items may not predict production. Because a formula based on one particular profile was about three times more effective than industry procedures now in use, we may wish to continue to gather and share data on turnover costs and selection effectiveness. The result of such a national dialogue may be enormous short-term savings plus increased per-person production for years to come.

---

[1] The Personal Orientation Profile is marketed at $50 each by Cambridge Human Resources, Two North Riverside Plaza, Suite 2200, Chicago, IL 60606.

[2] The Personal Evaluation Program is marketed by Leadership Profiles, Inc., 3701 Taylorsville-Route #5, Louisville, KY 40220. Cost of the P.E.P. decreased as the number of profiles were increased. At the time of purchase, the average cost per profile when 90 were used was $21.85.

Mary Coveny is President of CareerMatch Consultants, Inc., in Naperville, Illinois. A longer version of this paper is available from the Office of Real Estate Research, 304 David Kinley Hall, 1407 West Gregory Drive, Urbana, IL 61801. The research underlying the paper was partially supported by the Office of Real Estate Research.

DAVID L. CHICOINE AND J. FRED GIERTZ

Real Estate Tax Assessment Uniformity in Illinois

Real property tax receipts of local government in Illinois are the largest single revenue source for both the state and for local governments. Property tax extensions amount to over $6 billion annually. This is about twice the amount generated by the state's individual income tax, only slightly less than twice the state's sales tax receipts. The property tax is the most important independent revenue source for about 6,000 Illinois local governments and is the single most important revenue funding primary and secondary education.

Fundamental to the operation of the real estate tax is the valuation or assessment of property for tax purposes. The accuracy of property assessments is critical to the fairness of property taxation. At issue is how property taxes are apportioned among properties, according to the standards of equity contained in property tax law. Often-heard criticism of the real property tax is that inaccurate and nonuniform assessments are intrinsic to the tax and not easily corrected either through administrative actions or policy reforms.

We recently completed a major study of the structure and performance of the Illinois property tax assessment system, and we present highlights of this study here. A survey of all local and county assessing officials and records from the files of the Illinois Department of Revenue were the source of data for the study. The purpose of the study was to describe the property assessment system in Illinois and to analyze factors influencing assessment uniformity. Because of the unique features of property assessment in Cook and St. Clair counties and the differential method of assessing farm property, the study focuses on assessment of nonfarm property in the other 100 Illinois counties.

Tax Fairness and Assessment Uniformity

The property tax has always been controversial, but it has real staying power, and there seems little likelihood that it will be removed from the Illinois public finance system in the foreseeable future. Therefore, fairness in the administration of the property tax is critical. Assessment equity or fairness deals with the uniformity of assessments, particularly within taxing jurisdictions. Uniform assessments in a jurisdiction mean all properties are valued for tax purposes at the same percentage of market value. Nonuniformity of assessments within a jurisdiction means that property tax burdens will not be distributed in the manner legally defined as fair.

Departure from the standard of uniformity in assessments represents a violation of the principle of assessment equity. This violation means some taxpayers pay more tax than they should while others pay less than they should. For example, 31 counties in Illinois in 1983 had an average property tax bill either 50 percent more or 50 percent less than the correct amount because of assessment deficiencies.

Assessment uniformity is measured with the use of assessment/sales ratio studies. In Illinois these studies are conducted annually by the Illinois Department of Revenue for all counties and all local assessing districts with sufficient real estate market activity. The coefficient of inter-area dispersion (CD) is the most widely used measure of assessment uniformity and is calculated as part of assessment/sales ratio studies. The CD can be thought of as the average percentage (for example, 15, 20, or 25 percent) by which assessment levels on individual parcels in a jurisdiction vary from the median assessment level. The CD increases in value with a lower quality of assessment (that is, less assessment uniformity among parcels). A CD of zero would indicate every parcel included in the assessment/sales ratio study was assessed at precisely the same percentage of its selling price as every other parcel. A CD of 50, on the other hand, means that parcels included in the study had an assessment level that deviated from the median level (either above or below) by 50 percent. The average property owner in such a jurisdiction is paying either one-half or one and one-half times the amount of tax that should be paid if assessments were uniform.

There is no absolute level of uniformity that constitutes good or poor assessment quality. However, a standard between 15 and 20 is often considered a mark of good assessing and acceptable assessment uniformity. The variation in CDs among Illinois counties is substantial. Presented in the first column of the table are the CDs for 1983. Data for 1984, the most recent available, are similar to the 1983 information. The range in 1983 is from 15.6 in DuPage to 129.1 in Pulaski County. In 1983, six counties were under 21, 11 between 21 and 30, 34 counties between 31 and 40, and 50 counties over 40.

Since the difficulty of achieving uniform assessments varies from place to place, direct comparison of CDs as an indication of relative performance of assessing officials must be done with care. However, there is clear evidence that some areas in Illinois are assessed very poorly.

The estimated effects of nonuniform assessments on real estate tax payments of homeowners are presented in the second column in the table. The average over or underpayments were calculated using the average tax bill on single-family homes and the CD. For example, in Adams County nonuniform assessments resulted in an estimated over or underpayment of $188 in property taxes in 1983. The range is from $156 in Jasper County to $548 in St. Clair County. The average over or underpayment is inversely related to the CD, but directly related to the average tax bill. Thus, payment discrepancies in the more populous counties were high, even though CDs were low, because of larger average tax bills on single-family homes.

It should be noted that assessment uniformity has little to do with whether average property tax payments are high or low. Assessment equity deals with the distribution of total tax collections among property owners. The real benefit of assessment uniformity is that it provides for an equitable distribution of the tax burden according to the legally defined tax base. Thus, improving assessment equity implies savings by those overassessed and offsetting tax increases for those underassessed. Costs of improving uniformity will include higher public spending on assessing operations and political resistance by taxpayers with underassessed property.

The Illinois Assessment System

The assessment of real property in Illinois is primarily a local government function with state involvement. In 85 Illinois counties, elected local (township or multi-township) assessors have primary responsibility for initial assessments. Each county has a Supervisor of Assessments who oversees and, if necessary, revises the assessments set by local assessors. In Cook and the 17 commission counties, the elected Cook County Assessor and the Supervisor of Assessments are the responsible officials, respectively. The Illinois Department of Revenue carries out the equalization process among counties, and property owners who believe their property has been assessed improperly have access to an appeals process.

Local assessing districts in township counties are dominated by very small jurisdictions (49 percent of the 917 downstate districts have populations of 2,000 or less). It is common in smaller districts for all property other than single-family homes to be centrally assessed by county supervisors. A frequently advocated reform is the organization of assessing operations into larger units. The objective is to reduce costs and improve the quality of assessing and assessment uniformity.

Determinants of Assessment Uniformity

A statistical analysis was conducted to determine factors (both those under the control of assessors and those external to the assessment process) that are associated with assessment uniformity in Illinois counties and local assessing districts. One of the uses of the results is to evaluate the performance of the assessment system in counties in relation to the difficulty of the assessment task. Information on what determines assessment uniformity is the first step toward formulating recommendations that might improve the quality of assessments in Illinois and, thus, the fairness of the distribution of property taxes.

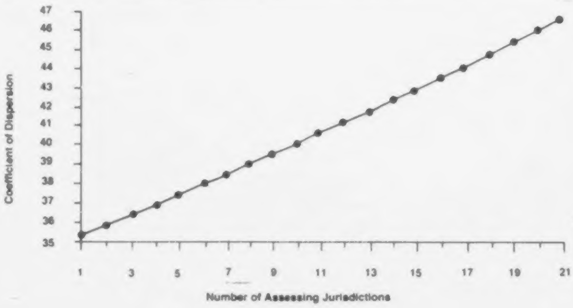
Assessment uniformity, as measured by the CD, can be thought of as being determined by a combination of the quality of the assessor (as well as resources available to the assessor) and the environment in which assessments are made. Expectations are that more highly skilled assessors in larger, more centralized assessing organizations will perform better than less-skilled individuals in smaller, less well-endowed organizations. Likewise, the more difficult the assessment environment, the less uniform assessments are expected to be, all things considered. Because Illinois has centralized assessing in commission counties and decentralized assessing in township counties, the impact of assessing district size and organization on uniformity can be analyzed. Important to the analysis is distinguishing the influence of environmental factors from the influence of assessor characteristics and assessment organization.

Using data from the survey of assessing officials and the files of the Department of Revenue, variation in the coefficient of dispersion among counties and among local assessing districts was investigated with multiple regression analysis. Similar factors were found to improve assessment uniformity in local assessing districts and in counties. Environmental factors that improved assessment uniformity were the percentage change in the number of housing units, the average tax bill for a home owner, and educational level of the population. Assessors need information to set assessments accurately, and an active housing market with new construction increases available information and, thus, improves uniformity of assessments. The average tax bill indicates the advantage of assessment appeals, and a more educated citizenry is more able to take advantage of the rather complex appeals process.

Environmental factors associated with lower levels of uniformity included the percentage change in housing values and the nonuniformity of the housing stock. Housing markets with substantial changes in value and with different types and ages of homes complicate the assessment task and reduce assessment uniformity.

Chart 1 illustrates the impact of the change in the number of housing units on assessment uniformity for Illinois counties. There are two relationships presented because assessment uniformity was found to be significantly better in township counties compared to commission counties when other factors were considered. These results certainly do not support consolidating property assessment responsibilities with county government. On the other hand, the number of assessing districts in a county was inversely related to uniformity, indicating possible advantages of

Chart 1. Number of Assessing Jurisdictions (township counties)



consolidating the smallest local districts (Chart 2). The analysis of uniformity among local districts supported this finding. Larger districts had more uniform assessments, but the advantage of size was not important beyond 4,000 population (70 percent of the local assessing districts are under 4,000).

Higher levels of professional training for county supervisors and local assessors were found to improve assessment uniformity. Well-trained assessors, at the local and county level, are very important in achieving property tax fairness.

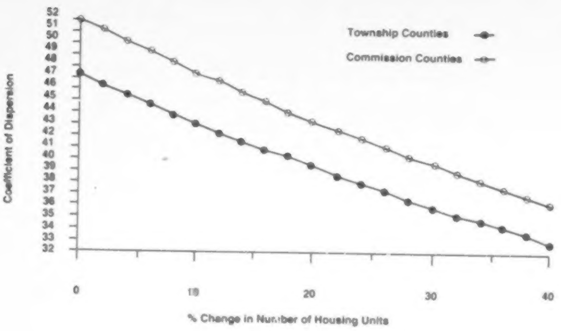
The results of the analysis of assessment uniformity were used to adjust actual county-level CDs for the difficulty of the assessment environment. Such adjustments allow for more meaningful comparisons of the performance of assessors across counties and help distinguish between good assessing and good assessments. The environmentally adjusted CD for each county is presented in the last column of the table. The adjusted CD for each county is the average or expected level of performance for that county, given its assessment environment. This column can be

Assessment Uniformity and Effects of Nonuniformity and Assessing Environment, 1983

County	*Average Coefficient of Dispersion*	*Adjusted Over or Underpayment of Taxes*	*Coefficient of Dispersion*
Adams	27.5	$188	41.0
Alexander	103.4	448	70.4
Bond	35.1	209	41.6
Boone	33.0	275	26.9
Brown	[illegible]	250	60.3
Bureau	46.3	382	45.5
Calhoun	56.8	252	64.0
Carroll	73.5	490	55.1
Cass	52.8	351	42.2
Champaign	22.3	237	25.8
Christian	40.3	257	49.6
Clark	45.8	227	41.5
Clay	41.4	220	51.5
Clinton	35.5	232	41.7
Coles	28.3	208	34.9
Cook	25.1	225	32.7
Crawford	43.0	210	45.2
Cumberland	58.0	314	44.2
DeKalb	21.1	252	27.6
DeWitt	36.2	226	42.5
Douglas	45.0	290	43.6
DuPage	15.6	278	11.4
Edgar	35.1	177	45.9
Edwards	50.7	214	64.7
Effingham	30.8	199	37.8
Fayette	50.1	270	52.6
Ford	42.5	286	38.6
Franklin	63.2	395	49.0
Fulton	57.9	441	48.7
Gallatin	69.7	289	62.5
Greene	56.4	243	50.4
Grundy	35.4	265	38.3
Hamilton	52.8	291	55.7
Hancock	58.3	220	46.2
Hardin	52.0	180	57.9
Henderson	35.4	190	45.8
Henry	47.9	369	43.0
Iroquois	74.4	534	45.1
Jackson	37.8	318	25.2
Jasper	35.4	156	44.9
Jefferson	45.0	304	39.6
Jersey	47.7	296	38.3
JoDaviess	60.9	379	42.3
Johnson	66.4	365	50.3
Kane	18.5	247	27.8
Kankakee	28.6	238	33.4
Kendall	19.2	218	16.7
Knox	37.9	279	37.3
Lake	18.9	314	21.0
LaSalle	41.1	328	50.0
Lawrence	51.3	234	46.8
Lee	38.9	291	37.8
Livingston	46.2	390	45.7
Logan	32.5	277	40.6
McDonough	33.5	251	32.4
McHenry	18.0	254	22.2
McLean	20.8	176	27.1
Macon	33.1	272	35.0
Macoupin	68.4	413	48.1
Madison	35.8	262	43.3
Marion	46.9	308	45.6
Marshall	66.9	531	40.4
Mason	38.6	271	39.9
Massac	48.5	265	53.8
Menard	50.9	413	43.1
Mercer	29.2	223	42.3
Monroe	25.3	198	44.2
Montgomery	69.7	379	56.9
Morgan	38.0	263	39.3
Moultrie	35.8	255	39.3
Ogle	48.0	388	37.4
Peoria	37.5	445	33.2
Perry	64.3	356	55.1
Piatt	36.3	246	40.7
Pike	39.4	166	53.1
Pope	47.6	173	68.5
Pulaski	129.0	385	68.8
Putnam	44.0	316	35.4
Randolf	42.6	252	44.1
Richland	33.2	189	43.1
Rock Island	35.8	354	34.3
St. Clair	76.0	548	50.3
Saline	32.0	177	52.7
Sangamon	38.2	344	31.8
Schuyler	67.4	384	47.9
Scott	71.5	311	58.7
Shelby	53.0	320	47.5
Stark	50.5	372	48.3
Stephenson	34.4	265	38.5
Tazewell	40.7	417	29.8
Union	71.0	505	54.5
Vermilion	35.9	256	42.5
Wabash	38.3	226	48.9
Warren	45.7	325	46.2
Washington	52.4	339	54.3
Wayne	51.2	301	43.7
White	30.1	157	40.7
Whiteside	39.3	326	38.0
Will	24.1	325	24.8
Williamson	45.5	221	44.8
Winnebago	27.7	287	29.1
Woodford	33.4	328	31.5

Source: Tables 2.3 and 5.3, in *Property Tax Assessment in Illinois: Structure and Performance*, Springfield, IL: Illinois Tax Foundation, 1986.

Chart 2. Change in Housing Units (county data)



compared with the "raw" CDs in the first column. An actual CD in a county that is less than the adjusted CD indicates the assessment system is performing at a higher level than would be expected, given the degree of difficulty of the assessment task. Similarly, an actual CD that exceeds the adjusted CD indicates the system is not performing as well as might be expected given the assessing environment.

Conclusions

Improving the fairness of the property tax in Illinois will require significantly improved assessment uniformity in many parts of the state. The results of this study demonstrated the impact of environmental, organizational, and assessor characteristics on assessment uniformity and suggest that serious consideration should be given to raising the minimum population of local districts to at least 4,000 or requiring small districts to contract for assessing services. Because environmental factors seem especially important in determining assessment uniformity, the use of a single uniformity standard to judge the performance of assessing officials and as a benchmark in incentive programs aimed at improving assessment uniformity is questionable. Universal standards are arbitrary, inflexible, and do not consider the various difficulties facing assessors in different locations. Measures of assessing quality should reflect the difficulty of the assessing environment if they are to measure the performance of county and local assessing officials accurately and distinguish poor assessing from good assessing.

David L. Chicoine is Professor of Agricultural Economics and J. Fred Giertz is Professor of Economics. Both are in the Institute of Government and Public Affairs at the University of Illinois. Research reported here was supported in part by the Office of Real Estate Research. Copies of the complete study, Property Tax Assessment in Illinois: Structure and Performance, *are available from the sponsor of the study, the Illinois Tax Foundation (201 East Adams St., Springfield, IL 62701) or the authors.*

PETER F. COLWELL

Patterns in Construction Activity in Illinois 1972–1987

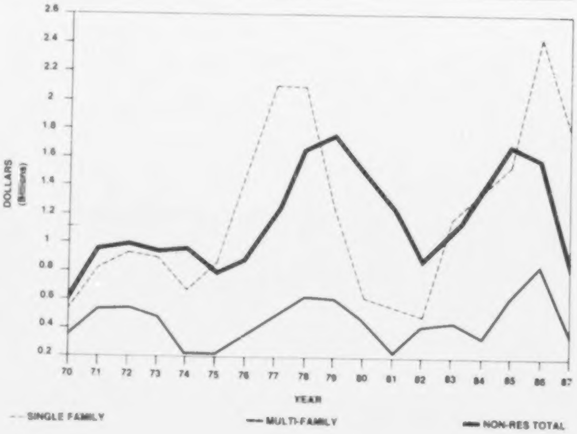
Construction activity has fluctuated greatly in Illinois over the past 18 years. These fluctuations are examined here by following the values of building permits in the state as a whole and in the five Metropolitan Statistical Areas of Chicago, Rockford, Decatur, Peoria, and Kankakee.

While there are stark differences among the five areas, there are also similarities. They have the same overall pattern for the time period: All areas show strong cyclical movements; all have peaks around 1977–1978 and 1985–1987; and almost all are expected to do better in 1987 than 1986 (based on the first seven months of data for 1987).

The State

Even though it appears that 1986 had the highest nominal residential construction activity, this is probably not the case. Chart 1 shows three peaks in single-family permits over the past 17 years. The first was a minor one in about 1972. The second was substantially greater for 1977 and 1978. The third occurred in 1986. However, 1987 includes only data for the first seven months. Hence, if we compare this number with the first seven months of 1986, we would find that there was an increase in permits for single-family homes. Permits for multifamily buildings show four peaks: the first in 1971–1972, the second in 1978–1979, a smaller one in 1983, and a larger one in 1986. Again, 1987 is larger when comparing the first

Chart 1. Building Permits, Illinois



seven months of data for both years (1986 and 1987). The nonresidential activity shows three peaks like single family permits: the first in 1972, the second in 1979, and the third in 1985. Also as in the case of single-family permits, the first peak was relatively small. The timing of nonresidential peaks is a little different, however. It might be that the earlier lag represents local service following the suburbanization of residences while the more recent lead represents the expansion of regional export activity.

In the state as a whole, there are parallels in the cyclical movements of different building permit types. All three permit types seem to move somewhat together. Single-family permits is the largest of the components, with nonresidential permits a close second and multifamily a distant third. Nonresidential building permits seem to lag behind single-family permits until 1982 and to lead thereafter.

Rockford

Instead of having its biggest peak in 1986, Rockford's single-family permits experienced the largest peaks in the 1977–1978 period (see Chart 2). However, the recoveries in the building permits in 1987 are predictable and, most likely, the values of building permits are going to be larger than in the 1977–1978 period. In the face of the shutdown of Quaker Oats, the recent issuance of building permits in Rockford is spectacular and may bode well for the future.

Cyclical patterns are observed in the Rockford data. Multifamily and nonresidential permits seem to lag one year behind single-family permits. This is as expected because when population grows or relocates (which is reflected in residential building permits), local service activities grow or relocate as well: Residential growth brings about the need for nonresidential buildings such as shops, schools, churches, and so on.

Chicago

Chicago building permit patterns are similar to those of the state as a whole. This is not surprising since it is the biggest urban area in Illinois and, therefore, contributes more than the other areas to the state totals.

Chicago experienced a lag in the nonresidential market vis à vis the single-family market from 1970 to 1984 (see Chart 3). However, the lag has become a lead for the most recent three years. This reversal is experienced elsewhere in the state as well.

The value of Chicago permits in 1987 for single- and multifamily permits will probably exceed that in 1986. This will not be the case for nonresidential permits. Nevertheless, the pace of nonresidential building in 1987 should still prove to be very rapid.

Decatur

Chart 4 shows two significant spikes in Decatur permits, one in 1973 and one in 1980. Both were in nonresidential permits. Otherwise, there has been relatively little activity for a number of years. The 1980 spike reflects construction of Hickory Point Mall, hotels, and office buildings. The slight recovery in nonresidential permits in 1986 relates to a number of

Chart 2. Rockford Building Permits

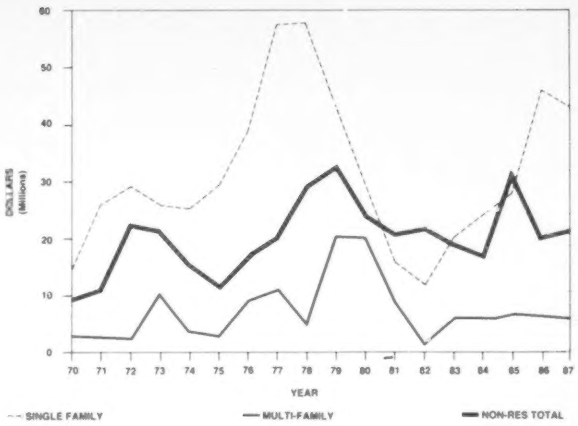


Chart 3. Chicago Building Permits

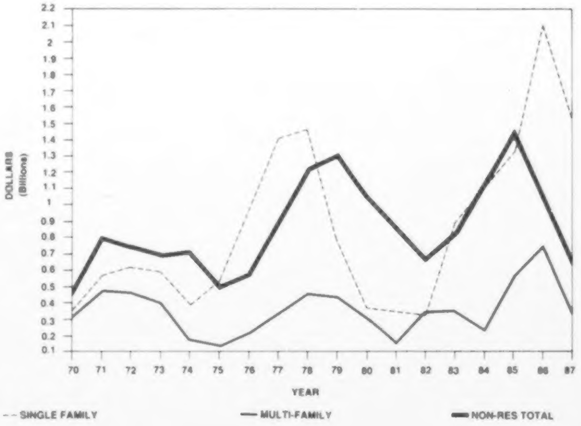


Chart 4. Decatur Building Permits

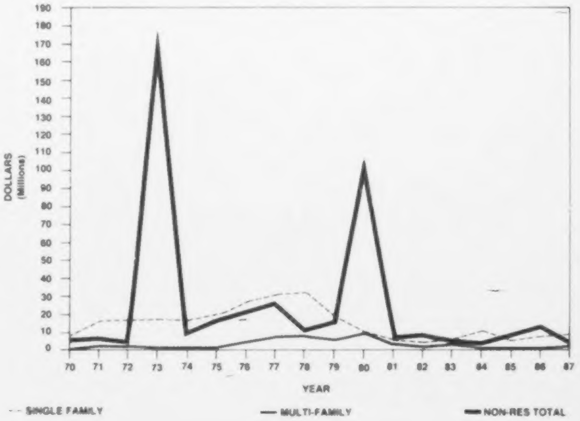


Chart 5. Peoria Building Permits

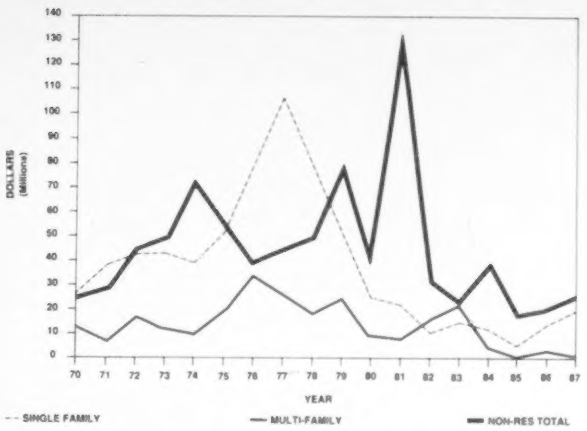
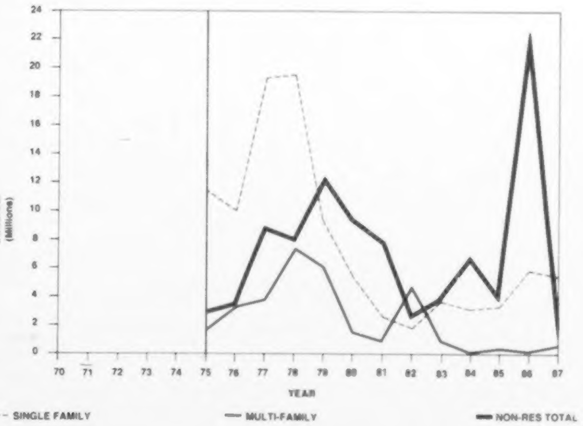


Chart 6. Kankakee Building Permits



small businesses. Of course, this current recovery is on a much smaller scale than earlier peaks.

A cyclical pattern exists but is not very obvious, and the lag cannot be observed easily from Chart 4 because of the effect the two spikes have on the scale of the chart. The two residential permit types can be predicted to have recoveries, but that cannot be said of the nonresidential permits. Multifamily building has been dead for six years except for 1983 and some minor activity in 1987. It would not be unreasonable to expect some multifamily housing construction in the year ahead.

Peoria

One of the unusual facets of Peoria's record is probably the number of years that nonresidential building permits exceeded single-family building—13 of last 17 years (see Chart 5).

The time lag of nonresidential permits behind single-family permits is again observed in Peoria. This is especially clear if one can ignore the 1981 spike as being essentially unrelated to the long-term cyclical pattern.

There seems to be a recovery underway in Peoria. But since Peoria has suffered a building depression for quite a long time, even this significant recovery will bring Peoria nowhere near previous peaks.

Kankakee

Since data for Kankakee were available only after 1974, the lag behavior can hardly be observed except that the 1975–1981 single-family permit pattern is replicated closely by the 1976–1982 nonresidential building permits. Both single- and multi-family construction was much reduced from previous levels.

Chart 6 shows a large spike in 1986. This spike in nonresidential permits in 1986 was the result of relatively more concentrated development than the one in 1979, which corresponds to the relocation of many small businesses.

One might expect some recovery in multifamily housing after a drought of many years. One might be less optimistic about nonresidential building except that Kankakee's economic link with the south Chicago suburbs may prove to be the driving force. Single-family construction should turn out to be better in 1987 than 1986, and one would not expect radical change in 1988.

Peter F. Colwell is the ORER Professor of Finance at the University of Illinois at Urbana-Champaign.

Illinois Business Indexes

Weakness in residential construction continued to retard the Illinois economy. The current indicator remained below the trend indicator in October and November (Chart 1). The primary cause of the downward movement has been the marked decrease in residential housing. Seasonally adjusted housing permits fell from a high of 4,801 issued in February, to 2,626 in November, a decline of 45.3 percent (Chart 2). As Chart 3 shows, the real value per building increased substantially between August and September. This increase in per building value of construction appears to be due to an increase in the construction of high-value residential housing, coupled with a decrease in the construction of low- and middle-value residential housing.

The real value of industrial construction increased by 60 percent in November, but on balance has remained fairly constant since early last year (Chart 4). The real value of stores and other mercantile construction rose in November to its highest monthly level since 1984 (Chart 5).

Although the help wanted advertising index has remained strong in Chicago and has increased in St. Louis, the Illinois unemployment rate remains above the national rate. Since September the Illinois monthly unemployment rate has increased. In contrast, the national average has continued its downward drift (Chart 6). Employment in Illinois fell by 124,000 in November, the steepest month-to-month drop in the history of labor force record-keeping in the state.

ILLINOIS BUSINESS INDEXES

	Percent Change Nov 1986-Nov 1987	*Nov 1987*	*Oct 1987*	*Sept 1987*	*Aug 1987*	*Nov 1986*	*Oct 1986*
Leading Indicator (Current Indicator)	−1.08[a]	9.63	9.69	10.49	11.68	10.71	7.98
Leading Indicator (Trend Indicator)	1.75[a]	10.35	9.85	10.92	11.06	8.60	7.17
Employment-manufacturing (in thousands)[b]	1.31%	934.6	934.1	934.4	932.6	922.5	921.4
Average weekly hours-manufacturing[b]	1.45%	41.9	41.5	41.6	41.6	41.3	41.4
Weekly earnings-manufacturing[b]	2.11%	$452.94	$448.62	$451.36	$453.44	$443.56	$443.39
Help wanted advertising-Chicago (1969 = 100)[c]	5.50%	115	115	117	120	109	105
Help wanted advertising-St. Louis (1969 = 100)[c]	0.00%	71	68	64	66	71	63
Retail Sales (in millions)[d]	1.30%	$5,903	$5,988	$5,776	$5,958	$5,827	$5,972
Coal production (in thousands of tons)	0.00%	4,201	5,750	5,542	5,226	4,201	5,440
Petroleum products (in thousands of barrels)[b]	−4.74%	1,810	2,000	1,875	1,810	1,900	2,158
Vendor performance[e]	17.86%	66%	70%	69%	60%	56.0%	54.0%
Building permits (in thousands)							
Residential housing units	−45.48%	2.273	3.008	3.065	4.616	4.169	4.087
Value of residential housing	−2.36%	$276,488	$336,511	$330,352	$318,192	$283,167	$273,180
Value of nonresidential construction							
Industrial buildings	202.17%	$40,119	$33,111	$32,512	$30,566	$13,277	$44,107
Offices, banks, and professional buildings	66.25%	$35,788	$80,276	$67,922	$33,539	$21,526	$48,283
Stores and other mercantile buildings	86.60%	$44,238	$47,094	$51,~~157~~	$34,784	$23,708	$28,208
Other	7.08%	$5,505	$8,077	$4,524	$8,677	$5,141	$4,593
Consumer price index (December 1977 = 100)							
North Central US[f]	4.59%	184.7	184.6	184.8	184.0	—	176.5
North Central/population more than 1,200,000[f]	4.55%	188.8	188.5	189.2	188.2	—	180.3
North Central/population 360,000 to 1,200,000[f]	5.00%	182.6	182.7	182.4	182.0	—	174.0
North Central/population 50,000 to 360,000[f]	5.28%	181.3	181.4	180.8	179.6	—	172.3
North Central/population less than 50,000[f]	3.15%	177.2	177.1	176.7	177.1	—	171.7
Chicago (1967 = 100)	4.35%	345.7	343.9	349.9	348.8	331.3	328.7
St. Louis (1967 = 100)	3.77%	336.0	339.5	323.8	—	323.8	
		1987:II	1987:I	1986:IV	1986:III	1986:II	1986:I
Personal income (in millions)[b,g,h]	4.83%	$188,293	$187,233	$180,304	$179,096	$179,622	$174,013
Per capita personal income[b,g,h]	7.56%	$16,165	$16,099	$15,527	$15,445	$15,029	$15,052

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, Nov 1987. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Percent change between Oct 1986 and Oct 1987. [g] Seasonally adjusted at annual rates. [h] Percent change between 1986:II and 1987:II.

Chart 1. Composite Leading Indicator (Average Percent Change in Base Indexes)

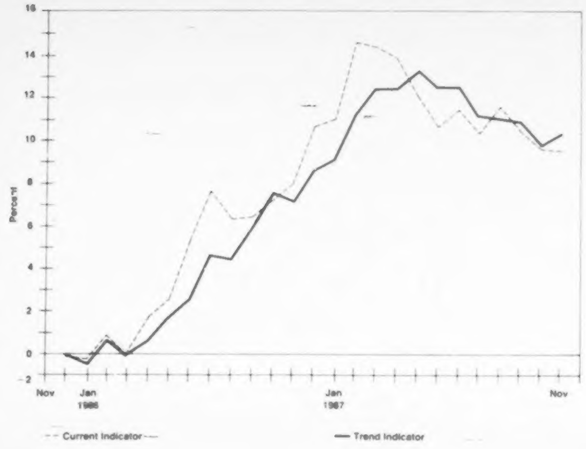


Chart 2. Housing Permits (Seasonally Adjusted)

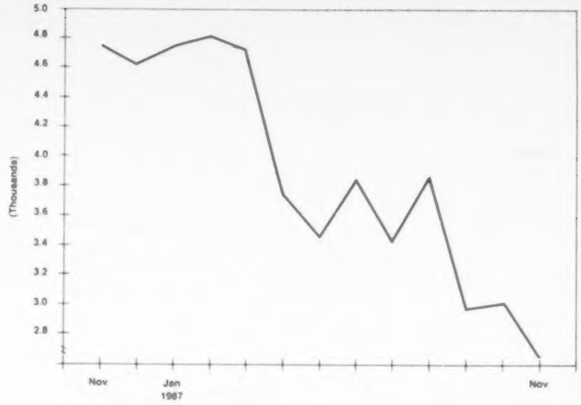


Chart 3. Real per Building Value of Residential Housing Permits (Seasonally Adjusted, 1967 prices)

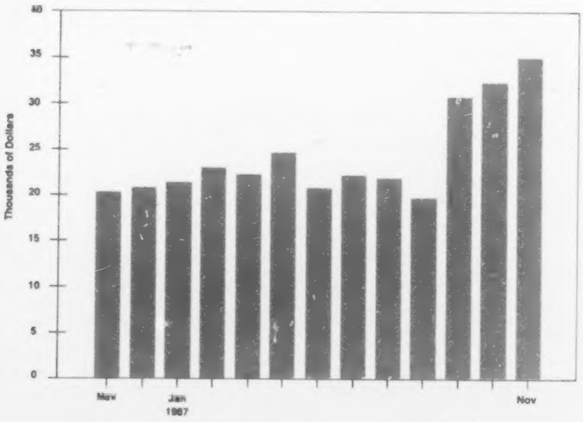


Chart 4. Real Value of Industrial Building Permits (Seasonally Adjusted, 1967 prices)

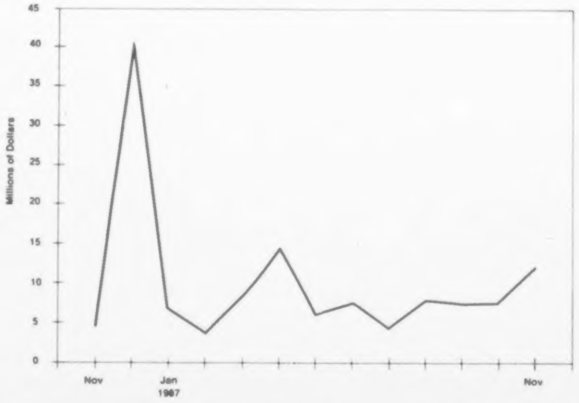


Chart 5. Real Value of Stores and Other Mercantile Building Permits (Seasonally Adjusted, 1967 prices)

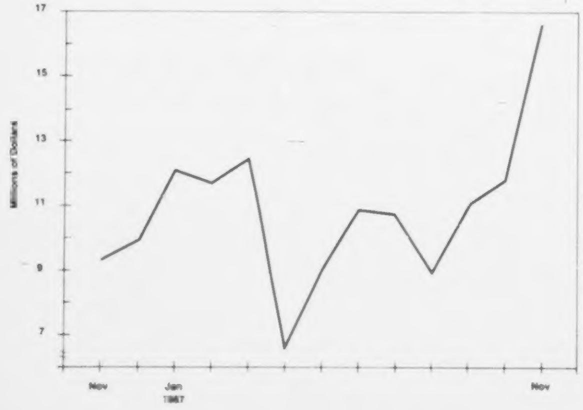
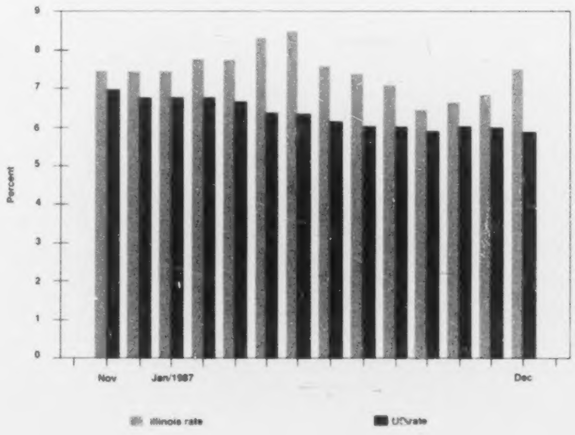


Chart 6. Unemployment Rates (Seasonally Adjusted)



Second-class postage paid at Urbana, Illinois

Illinois Business Review

Bureau of Economic and Business Researc
428 Commerce West, 1206 South Sixth St
Champaign, Illinois 61820

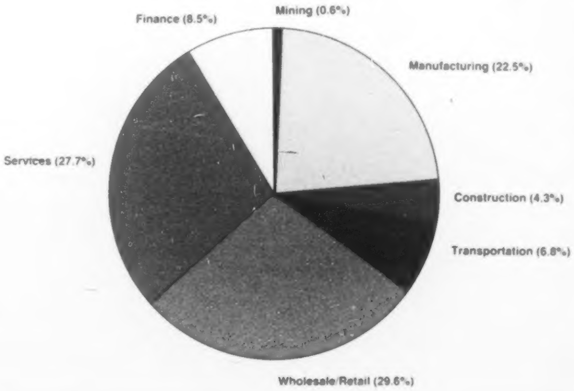
CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

Illinois Economic Outlook

The Illinois Econometric Model predicts slow growth in total employment in 1988. The industries expected to experience the fastest growth are wholesale and retail trade (2.57 percent), services (2.50 percent), and the financial sector (1.90 percent). Due to their relative size, as illustrated by the accompanying chart, these sectors are an important factor in overall job growth. Positive contributions in services and trade are especially important, considering the sluggish growth rates expected in other industries. The only manufacturing sectors expected to grow over the forecast period are the chemical and primary metals industries as indicated by the table. It appears that the state's manufacturing base will continue to stagnate much as it did in 1987.

Private nonfarm employment in Illinois increased by approximately 1.7 percent in 1987, representing an additional 70,000 jobs, with most of the gain in wholesale and retail trade (3.52 percent), utilities and transportation (1.63 percent), and the financial sector (1.59 percent). With the exceptions of mining and durable goods manufacturing, all sectors experienced some increase in employment.

Illinois Employment (relative share by sector)



Illinois Seasonally Adjusted Employment

	History				*Forecast*			
	86:IV	*87:I*	*87:II*	*87:III*	*87:IV*	*88:I*	*88:II*	*88:III*
Total private nonfarm (thousands)	4,116.0	4,054.8	4,125.4	4,152.4	4,163.4	4,166.9	4,170.0	4,175.4
Mining	24.7	24.5	24.3	24.4	24.1	23.8	23.4	23.0
Construction	182.5	183.0	174.8	177.3	175.6	172.4	169.0	166.1
Manufacturing	923.6	927.8	925.6	929.7	926.3	916.9	908.4	902.2
Durable manufacturing	562.6	564.1	561.8	566.1	563.5	555.0	547.5	542.5
Primary metals	55.0	55.4	55.4	56.1	56.4	56.6	56.7	57.5
Fabricated metals	110.5	110.7	110.9	111.9	111.1	109.1	107.4	106.4
Nonelectrical machinery	137.2	138.0	138.5	139.7	137.9	136.1	135.2	133.7
Electrical machinery	117.8	117.8	117.7	117.5	116.8	115.3	112.6	110.6
Miscellaneous durables	141.9	142.0	139.7	141.0	141.3	137.9	135.6	134.3
Nondurable manufacturing	354.5	364.6	363.7	363.1	362.8	361.9	360.9	359.6
Food products	90.3	91.8	91.7	91.0	90.8	90.7	90.6	90.3
Printing and publishing	105.1	106.8	106.7	106.4	106.3	105.4	105.2	104.8
Chemicals	56.4	56.8	57.0	57.1	57.7	57.9	58.0	58.2
Miscellaneous nondurables	107.9	108.7	108.8	109.0	108.1	107.9	107.1	106.3
Utilities and transportation	277.7	279.6	282.7	283.5	280.3	277.4	275.0	273.0
Wholesale and retail trade	1,197.1	1,209.3	1,222.2	1,237.2	1,244.2	1,251.7	1,257.7	1,262.9
Services	1,137.6	1,138.5	1,143.6	1,146.4	1,156.8	1,166.7	1,176.6	1,186.5
Finance, insurance and real estate	350.3	350.5	352.2	354.0	356.1	358.1	359.9	361.7

Bureau of Economic and Business Research

4/29/88 U6910-1

April 1988
Volume 45, Number 2

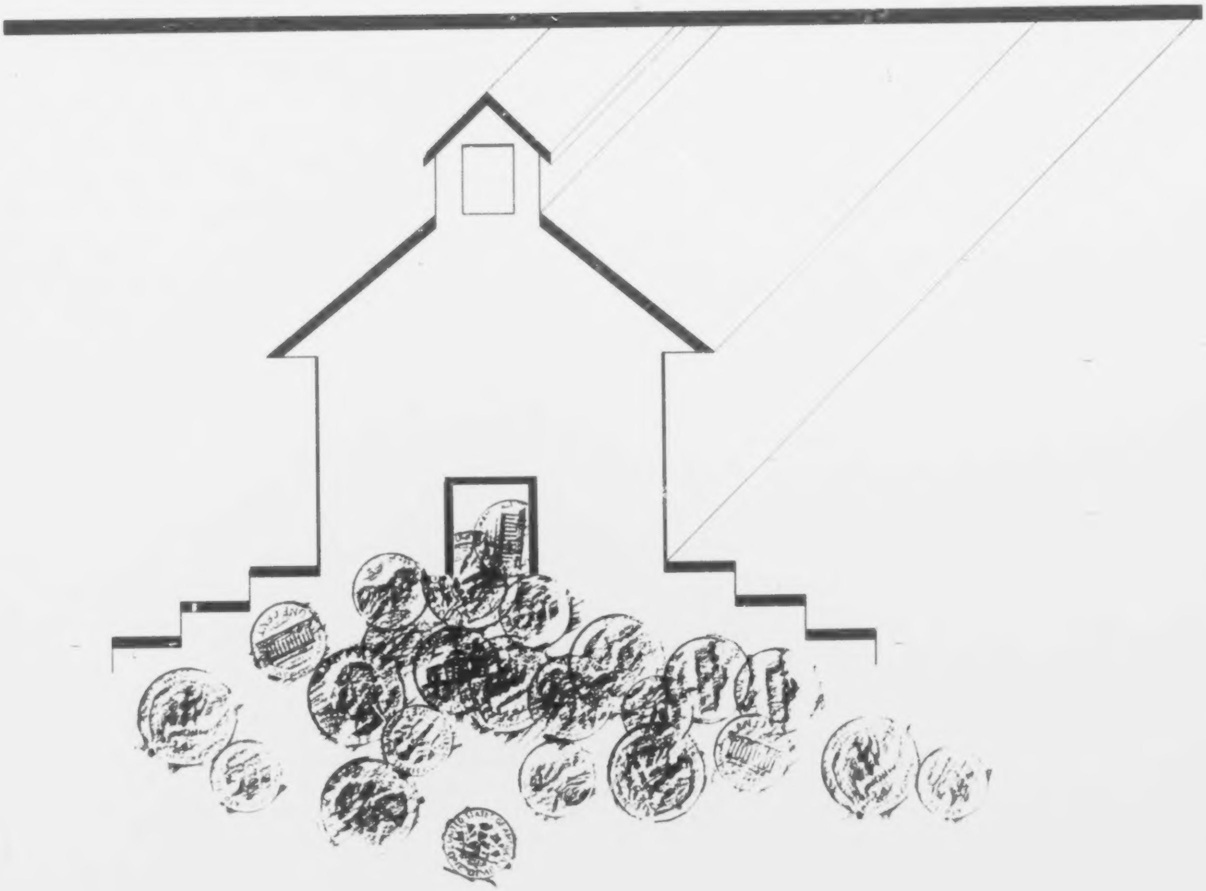
Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana/Champaign

Schooling, Taxes, and State Employment Changes/ 2

The Diversion of Great Lakes Water to the Arid West/ 5

Property Taxes/ 10



April 1988 Illinois Business Review Volume 45 Number 2

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Director, Robert W. Resek; *Acting Director,* Marvin Frankel; *Editor,* William R. Bryan; *Technical Editor,* Janet R. Fitch; *Designers,* Ronald Sterkel, Rajene Fry, and Kimberly Nyberg; *Research Assistants,* Paul C. Bishop, Gregory A. Gilbert, Martin Dwyer, Mary A. Laschober, and Anne E. Winkler; *Director of the Office of Real Estate Research,* James R. Follain.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide businessmen of the state and other interested persons with current information on business conditions.

Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.

The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois.

Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

William Sander and Peter V. Schaeffer

Schooling, Taxes, and State Employment Changes

There has been, with good cause, much ado regarding the phenomena of the Sunbelt and Rustbelt, the rural turnabout, and the decline of the cities during the 1970s. The data indicate substantial changes in the distribution of jobs and people within the United States between 1970 and 1980 (Table 1).

One issue of concern regarding regional economic trends is the effect of state and local taxes. Statistics indicate either no systematic relationship between state and local taxes and industrial development or a negative relationship. In any case, state and local taxes support investments in schooling that may have positive effects on state and local business climates. Several studies, as well, indicate that this is the case.

In this article, we examine the effects of state and local taxes and schooling attainment on state employment changes between 1970 and 1980. We provide modest evidence for the hypothesis that state and local investments in schooling enhance a state's business climate.

The Theory

Education is an investment in human capital: Schooling provides a foundation for the acquisition of effective job skills. Although we recognize that preparing students for their working lives is not the only purpose of education, it is this aspect that is related to the economic performance of a region or state. Schooling improves the productivity of workers. For example, the ability to follow written instructions or to perform arithmetic operations is of value in many occupations.

For the purpose of our discussion, we assume that workers engaged in a given production process all have the same productive potential. Differences among workers can be attributed only to the capital stock that they have available to work with and to differences in their schooling.

Consider now a firm that produces something (output). The production process requires two inputs, labor and capital. In order to compare this firm's demand for labor to that of a competitor in another region, we have to take into account possible skill differences among workers in the two regions. It is assumed that education increases the skills of workers.

The firm is assumed to charge a price determined by the market (to be a price taker) and to maximize profit. Under these assumptions, the firm will hire workers until the value of labor is equal to the wage rate. The economic value of a worker depends on schooling. An increase in the level of education has a positive impact on output. The firm, therefore, is willing to pay for education. Thus, taxes do not necessarily have a negative effect on location decisions and regional employment growth.

Although it is not possible to separate the effects of education on production from its consumer value, it is possible that high education locations are attractive to industry because of consumption value. Workers may prefer to live in locations that provide better quality schooling for their children. Thus, high education locations may contribute to employment growth for both its relationship to production and consumption.

We have analyzed the determinants of the demand for labor for a particular industry. Total demand for labor in a state is the sum of the demand over all industries. It is clear, therefore, that the aggregate demand, and the growth of the aggregate demand, depend on the state's mix of industries. The specification of a model of state employment growth and schooling must, therefore, control for the effect of industry mix on employment growth.

Table 1. Employment and Population Growth Rates by Region, 1970–1980

Region	Population Growth Rate	Employment Growth Rate
New England	4.2%	20.6%
Middles Atlantic	1.1	6.4
East North Central	3.5	14.7
West North Central	5.2	28.6
South Atlantic	20.5	39.9
East South Central	14.5	34.2
West South Central	22.5	56.2
Mountain	37.2	68.8
Pacific	19.8	43.4

Data and Specifications

Following previous research, we specified relatively simple empirical models to estimate (1) the rate of employment growth and (2) the relative differential shift in state-level employment growth between 1970 and 1980. The differential shift is an estimate of the impact of differences in industry-by-industry performance between a single state and the United States. A superior (inferior) performance of the state's industries will lead to greater (smaller) employment growth than would be expected on the basis of the state's industry mix in 1970. Thus, in the second specification we look for explanations of why state industrial performances differ from the national trends for those industries.

In case one, when we estimate state-level employment change, we have to adjust for the industry mix in 1970 because this is expected to affect the rate of employment change. In the second case, the differential shift shows state-by-state deviations from the national trend net of any effect of industry mix. Thus, in the first case, we adjust for the industry-mix effect on the right-hand side of the equation; the adjustment is made on the left-hand side in the second case. The second approach is based upon the shift-share methodology that we shall briefly review.

Because states are open economies, their performance depends on events and trends over which they have little influence. Within the United States, it is reasonable to assume that state economic performance is somewhat correlated with the performance of the national economy. The growth rate of the state economy may, therefore, be compared to that of the United States. Take state employment in the base year ($t = 0$) and multiply it by 1 plus the national growth rate between $t = 0$ and $t = 1$. Subtract the result from the observed actual employment of the state at $t = 1$. If the state grew at a rate above that of the country as a whole, this difference is positive. It is zero if the growth rates coincide and negative if the state was lagging. In the language of shift-share analysis, this difference is referred to as the total shift.

The purpose of shift-share analysis is to separate two different effects that together make up the total shift. The first effect indicates that if a state's employment base is dominated by industries that have slow national growth rates, then one expects that state to grow relatively slowly, too. The second effect is a product of the performance of a state's industries relative to that of the same industries in the comparison region. A particular industry may grow slowly (quickly) at the national average, but it may grow quickly (slowly) in the state. Shift-share analysis provides formulas that describe these two separate effects.

The value of shift-share analysis for our analysis is clear. It allows us to separate industry-mix effects from other reasons for a state's differential employment growth. The theoretical analysis suggests that states may experience differences in employment growth for a variety of reasons. The one that is of particular interest here is education. By taking out the effect of the industry mix, the empirical analysis should yield stronger results on the impact of other factors.

An adjustment is also made for the percent of workers belonging to a union in a state in 1970 in order to reflect the possible effect of "high" union wages upon employment growth. That is, it was expected that the more unionized states are more adverse to industrial development, *ceteris paribus*. The union variable probably captures other (negative) effects, as well. In preliminary work with state-level data, we found that unemployment compensation payments per worker were highly correlated with the level of unionization. Thus, it was not possible to delineate the independent effects of unionization and unemployment compensation because of the high level of collinearity between the two variables.

State and local taxes per capita in 1970 are entered to adjust for the effect of taxes on employment. The effect of taxes is conceptually ambiguous because taxes may have both positive and negative effects on industrial location.

The percent of the population that was either 65 years or older or less than 5 is included to reflect the possible effect of relatively old and relatively young populations on employment growth. It is assumed that this variable (called age) reduces growth in labor supply, thus reducing employment growth. An adjustment is made for the median years of schooling attained by the state's population age 25 years and older in 1970. We believe that educational attainment may enhance the economic attractiveness of a state and, thus, contribute to employment growth.

Finally, we adjust for the rate of employment growth between 1950 and 1970 (called trend). The most important reason for doing this is that changes between 1970 and 1980 are partly the product of long-term changes in the regional economic structure of the United States. Thus, long-term changes in the location of markets between 1950 and 1970 may have important effects on employment growth between 1970 and 1980.

Results

Statistical procedures are first used to estimate the rate of growth in state-level employment between 1970 and 1980 (Table 2). The results indicate that the percent union, taxes, and the percent dependents (age) have negative effects on employment. Schooling, the industry mix, and employment trends have positive effects.

Although it is not shown, the negative effect of taxes increases substantially if a schooling adjustment is made. This implies that the contribution of states and local taxes to schooling may enhance its business climate.

In general, the results of estimating relative differential shifts in employment (Table 3) are similar to the above results. One slight difference in these estimates is that the level of significance of the schooling variables is higher, thus adding more support for the positive contribution of schooling to state employment growth.

We calculated elasticities at mean values (Table 4) based on the coefficients we estimated in Table 3. The most striking result from this exercise regards the magnitude of the schooling elasticity. A 10 percent increase in schooling attainment increases the rate of state employment growth by 17 percent.

Table 2. Estimates of State-Level Employment Growth, 1970–1980

Union	−.005*
Industry mix	.025*
Age	−.024*
Taxes	−.0008*
Trend	.171*
Schooling attainment	.057*

*Statistically significant at the 10% level.

Table 3. Estimates of Differential Shifts in State-Level Employment, 1970–1980

Union	−.58*
Age	−2.95*
Taxes	−.10*
Trend	19.59*
Schooling attainment	14.30*

*Statistically significant at the 10% level.

Table 4. Elasticities at Point Means

Variable	Sign	Elasticity
Union	−	.3
Industry mix	+	.1
Age	−	1.1
Taxes	−	.8
Trend	+	.3
Schooling attainment	+	1.7

Conclusions

State employment changes during the 1970s were affected positively by the level of schooling in states in 1970. If an adjustment is made for schooling, the effect of taxes on employment is negative. As is noted, the magnitude of the tax effect declines substantially if an adjustment is not made for schooling. The most plausible reason for this is that state and local taxes that are invested in schooling have increased the stock of human capital in a state and, subsequently, the state's attractiveness to industry.

Employment trends in a state before 1970 were shown to be positively correlated with changes between 1970 and 1980. One plausible reason for this is the relocation of markets within the United States over time.

The industry mix in a state in 1970 had some bearing on employment changes during the 1970s as would be expected. States with a higher share of low-growth industries did not do as well as states with a higher share of high-growth industries.

Increases in unionization tended to adversely affect employment growth. In addition, relatively fewer jobs were created in states with a very young and/or very old population.

In closing, we would note that our results do not necessarily imply that additional spending on schooling in the future will necessarily improve a state's business climate. We believe this to be the case if, and only if, the additional expenditures result in better schools.

William Sander and Peter V. Schaeffer are associate professors in the Department of Economics, DePaul University, and School of Architecture and Planning, University of Colorado at Denver, respectively. *The authors would like to thank J. Fred Giertz for his comments, and the Institute of Government and Public Affairs at the University of Illinois, Urbana-Champaign for providing financial support.*

Marvin J. Barloon

The Diversion of Great Lakes Water to the Arid West

"The United States . . . is running out of its most indispensable commodity. That commodity is clear, usable water." So warned Congressman Jim Wright of Texas in his 1966 book, *The Coming Water Famine*. For the nation as a whole, there is no present cause for alarm. But, for some regions, the alarm is already sounding. The "water famine" has been troubling the Colorado River Basin for a long time. By the end of the century, the famine will also be felt with rising severity in sections of the High Plains, that is, in the north-south column of states east of the Rockies, from Montana down into western Texas.

The abundant waters of Illinois are directly involved in this prospect. The dwellers of the Colorado Basin and the High Plains are beginning to eye the Great Lakes for relief. William Busten, Director of the Center for the Great Lakes, told the meeting of Great Lakes governors in 1983 that little doubt remains but that, as water supplies tighten in the coming years, the western states will look to the Great Lakes as a potential new source.

The Great Lakes constitute the largest body of usable fresh water in the world. They contain an estimated 5,473 cubic miles of good water, enough to inundate the entire United States to a depth of eight feet (including Alaska and Hawaii). Probably the most feasible outlet for channeling lake water westward is the connection at Chicago between Lake Michigan and the Illinois River, which in turn connects with the Mississippi at Alton.

Proposals for such diversion have not yet jelled, but the matrices are in place. In 1976, Congress enacted Public Law 94–586, providing for a comprehensive survey to include possible importation of water in the West. The 1982 report of the "High Plains Study Council," representing the governors of six western states, contemplates transfers from other basins. In its 1984 report, the "Texas 2000 Commission" recommended development of a plan for options for interstate and even international transfers of water.

In 1985, the governors of the Great Lakes states and Canadian provinces formalized the Great Lakes Charter, in which each pledges to consult the others and to seek joint action before authorizing any further diversion of lake water. But this is not enough. Developments in the arid sections of the West may well proceed without explicit reference to the Great Lakes until a culmination is reached under which diversion form the lakes would become almost irresistible. It is, therefore, important that Great Lakes interest give close attention western water problems and programs and to their long-term implications, even though in their initial stages such programs may seem irrelevant to the lakes, and that lake interests be heard long before the emergence of any direct threat to their waters.

The Ogallala Aquifer

Depletion of the Ogallala Aquifer, at present a major reserve of High Plains water, may well precipitate the issue. This aquifer consists of ground water lodged in subsurface porous rock and sandstone, feeding wells drilled mainly for irrigation. The Ogallala Aquifer extends all the way from Wyoming down into western Texas, underlying an area over three times the size of Oklahoma.

The High Plains are literally mining this deposit. The US Water Resources Council reports that the amount of water pumped from the Ogallala in 1975 exceeded replenishment by nearly one-third. The Council adds, "In some of these (High Plains) areas ground-water levels are declining from seven to ten feet per year."

As this continues unabated, the ever-deeper wells will gradually become prohibitively costly. Ground water moves slowly. It would take centuries to replenish the Ogallala.

High Water on the Lakes

By contrast, the Great Lakes now have too much water—at least for many lakeside dwellers. Wave action is washing away beaches and undermining shore properties. A survey of erosion and inundation damages by the Army Corps of Engineers for the period, 1972–1976, revealed losses of over $73 million on the south shore of Lake Erie alone. In 1987, the losses were greater. At first sight, it might appear logical to transfer some of this excess water to the West, to the mutual benefit of the two regions.

But, the benefits would be temporary at best. Lake levels vary unpredictably over periods lasting from three to ten years. For example, from 1960 to 1964, the surface of Lake Michigan fell about three feet. The next nine years it rose five feet. These fluctuations are a normal response to changing precipitation in the lakes basin. For this reason, periodic high water on the lakes cannot provide dependable help in the High Plains or the Colorado Basin. Excessive lake levels do not synchronize with western needs. The most severe drought in the West occurred during the Dust Bowl years of the 1930s when lake levels were the lowest in the 20th century. Clearly, the West could not turn its water use on and off in response to changing lake levels, unpredictable both in occurrence and duration.

Great Lakes Vessels in Shallow Channels

Unhappily, therefore, we shall almost certainly be confronted with an interregional conflict of interest. Indeed, the conflict will be international. All the lakes except Lake Michigan are boundary waters, and our Canadian neighbors would bear a share of the cost while reaping little or nothing of the benefits.

Diversion would add to the cost of lake shipping in both countries. The tonnage of freight carried on the Great Lakes and the St. Lawrence Seaway annually is about equal to that of the two ports of New York and Philadelphia, combined. The Chicago area moves more of this freight than any other US lake port. Great Lakes traffic underlies much economic activity all the way from the Missouri River to Montreal.

What difference would a few inches make to ships breasting 25-foot billows on the stormy lakes? Lake Superior is over 1,300 feet deep. The answer is: little or none on the open lakes. But, the inches count in the channels leading from one lake to another and in the ports. During high-water years, the lake-to-lake channels are normally limited to a draft of about 27 feet, equivalent to that of the St. Lawrence Seaway. Dozens of smaller lake ports are limited to lesser drafts, even in their main channels. Monroe, Michigan, for example, is limited to vessels of a 20-foot draft, and Rochester, New York, to 24 feet. By way of comparison, the limited drafts in the main channels of the Port of New York lie in the range of 35 to 45 feet, of New Orleans, of 36 to 40 feet.

In 1977, the water level in the Great Lakes connecting waters had fallen about 12 inches from that of 1976. N. Terry Burton, fleet manager for the Inland Steel Co. of Chicago, said that, in consequence, some of the ore vessels of his firm were loading 2,000 tons less at a cost of some $8,000 per trip. For a heavy commodity, such as iron ore, every one-inch drop in the water level means that a vessel's cargo is reduced in the range of 100 to 200 tons. At 1977 carrier rates, a mere two-inch diversion of lake water to western lands would have increased the $8,000 cost cited by Mr. Burton to nearly $9,500 per trip.

Although shrunken in recent years, the steel industry reliant on Great Lakes ore shipments remains very large. In 1986, steel works in the Great Lakes states, dependent principally on lake and Seaway ores, produced about as much steel as all of France and West Germany combined and employed some 130,000 workers.

Extensive coal mining communities, farm regions, and railroad systems would also feel the impact. The coal shipped on the Great Lakes in 1986 was equivalent to the output of about 11,000 Appalachian miners, and the low cost of lake coal held electric bills in check all the way from Montreal to Duluth. Lake-borne grains and soybeans represent yearly farm revenues of about $2.0 billion—mostly Canadian. Shallower lake channels would also shrink railroad revenues. Most of what moves on the lakes originates or terminates by rail—coal from Kentucky, West Virginia, Pennsylvania, and Montana—grain from farm regions as distant as Manitoba, Nebraska, and the Dakotas.

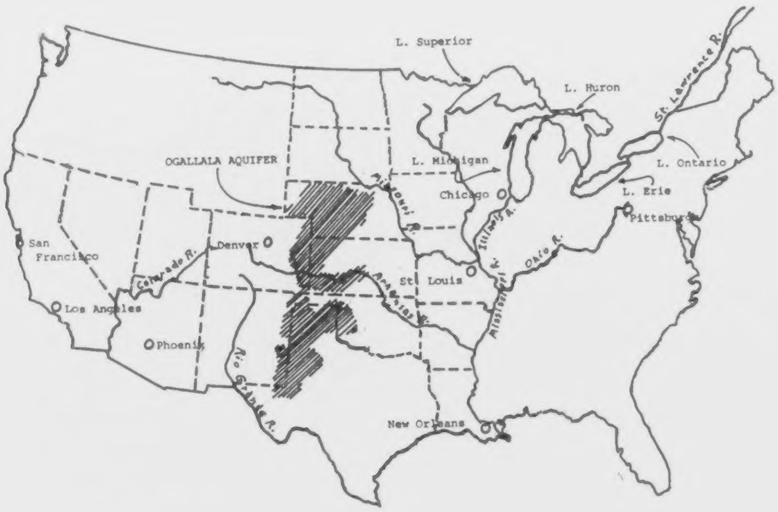
Although dominated by a few bulk movements such as these, lake commerce is quite diverse. The Army Corps of Engineers reports 50 different commodities carried on the Great Lakes in yearly quantities exceeding 100,000 tons each. Many of these also traverse the St. Lawrence Seaway. The Seaway is already contending with a problem of reduced traffic. Seaway transits peaked at 63.3 million tons in 1977, but, in the mid–1980s, had fallen back to around 50 million tons yearly, with a corresponding impairment of toll revenues.

Hydropower on the Laurentic Rivers

Nor would the impact of diversion be confined to shipping. Great Lakes water pours through the Turbines of three great hydroelectric centers, one near Niagara Falls and the other two on the St. Lawrence Seaway. These three, combined, have a capacity equivalent to one-quarter of the New York State total. The Niagara Power Project, alone, provides about 14 percent of all the electric energy consumed in that state.

These stations have a dedicated constituency. They are all operated by public power authorities, that of New York State and those of Ontario an Quebec. They withdraw no water; they consume no fuel; they discharge no air pollutants; and they involve no nuclear hazard. Diversion would significantly reduce the flow

The Ogallala Aquifer, the Western Rivers, and the Great Lakes



of the waters powering these stations and would have the same economic effect as an uncompensated dismantling of some of the installed capacity. Such a levy would not be received in silence by the millions of households in the service areas.

Diversions Accomplished

Piecemeal diversions of lake water have been in effect for a long time. In 1848, the busy canal diggers of the era initiated the diversion at Chicago from Lake Michigan into the Mississippi Basin via the Illinois River. This seepage continues at irregular rates, by order of the US Supreme court not to exceed an annual average of 3,200 cubic feet per second (cfs). This and other punctures in the system represent a net outflow of about 5,000 cfs, equal to roughly one gallon out of every 40 that pour over Niagara Falls. Not much, but the precedent is there.

Water Use versus Water Consumption

Diversion to the High Plains would add substantially to the nation's water consumption. The principal uses of lake water—shipping, hydropower, and recreation—do not even involve withdrawals, and most withdrawals from the lakes for such uses as manufacturing, power generation, and municipalities, are offset by discharges. What comes out the faucet goes down the drain and back to whence it came. Manufacturing, on the average, returns to the lakes and streams about 89 percent of what it withdraws. The water is, thus, available for reuse by lower-lakes communities, and its use is a problem, not of sufficiency, but of pollution control.

But, water use on the High Plains is mostly agricultural, and farming is not only a water user, it is a hugh water consumer. What comes out the faucet goes, not down the drain, but into animals and plants and off into the atmosphere. Virtually 100 percent of animal ingestion is totally lost. In the Missouri Basin, 85 percent of all water withdrawn is for irrigation, and, of this, about 45 percent is lost.

Nationwide, the rising consumption of water is a matter of growing concern. The supply is fixed by the yearly precipitation of rain, hail, and snow. It is no greater now than when the Constitution was adopted in 1789. The country was then home to only 3.9 million people. Now, 241.5 million are drawing on that supply. And every year we are consuming more water per person. Diversion from the lakes to western irrigation would advance the day of nationwide reckoning.

Paradoxically, relative to their population, the arid High Plains are much bigger consumers of water than the rest of the country. In 1980, the daily withdrawals from all sources in the four states of Nebraska, Kansas, Oklahoma, and Colorado averaged 3,685 gallons per person. The national average per capita was only 1,953 gallons, and that of the Great Lakes states only 1,368.

The Mirage of Pipelines to the Colorado Basin

Possible transfer from the lakes to the Colorado River Basin (centered on Arizona and Utah) presents difficulties so extreme as to be hardly credible. Not only is the Colorado Basin too far away. (The overland distance from Chicago to Phoenix is about 1,500 miles.) The Basin is also much too high. From the Mississippi River Westward, the land slopes upward to a high plateau. The level of Lake Michigan at Chicago averages about 579 feet above sea level. Much of eastern Arizona exceeds 5,000 feet; the average elevation of New Mexico is 5,700 feet and of Utah 6,100 feet. Water from Lake Michigan for the Colorado Basin would thus require an enormous system of pipelines carrying pumped water under pressure.

The largest oil pipeline in the United States is the 40-inch diameter Capline, running from southern Louisiana to central Illinois. Capline's capacity is about 1.2 million barrels per day. Daily water withdrawals in the Colorado Basin now approximate 376 million barrels. To provide just 5 percent of the Basin's withdrawals would clearly require about 16 Caplines.

Such an undertaking would be comparable to pumping the entire Chicago River a vertical height of about a mile while transporting it horizontally some 1,500 miles. On the way, the water would have to be bridged over the Mississippi, the Missouri, and a number of lesser rivers, all flowing downward beneath the unbound water from the lakes. In addition to the capital outlay running into double-digit billions, interminable operating and maintenance costs, including huge energy expenditure, would be beyond precedent in a peacetime undertaking.

Pipelines to the High Plains

Neither, in all probability, could any project for direct transfer from the lakes to the nearer High Plains east of the Rockies be economically justified. Elevations in the High Plains fall generally in the range of 2,000 to 3,500 feet, representing a lift from Chicago of some 1,500 feet or more, comparable to the height of the Sears Tower. Volumes would approximate those cited for the Colorado Basin.

With respect to most of the existing federal reservoir projects in the West, the Bureau of Reclamation established justification by merging the prospective and abundant hydroelectric benefits with those of irrigation in a general project account, so that irrigation received a largely free ride as a species of by-product. By contrast, hydroelectric credits could not help a prospective transfer from the Great Lakes. Whatever hydroelectric potentials might be found in the project, the offsetting hemorrhage of energy in pumping Great Lakes water upgrade would grossly outweigh the credit. Furthermore, any valid benefits-cost analysis of direct transfer would require inclusion of the costs to the economy of the Great Lakes region, a handicap absent from the earlier evaluations of existing western works.

Proposals for direct pumping from the lakes, either to the Colorado Basin or the High Plains, will probably be advanced. But, if so, they will be irresponsible and should not receive much of a hearing. Dr. Allen V. Kneese, Senior Fellow of the Quality of the Environment Division of *Resources for the Future,* comments:

> Even a cursory look at the economics of imported water starkly reveals what an outlandish idea it is . . . water importation is a thoroughly bad idea, even if just the economics are considered; imagine an environmental impact statement for such a project.

Replenishing the Mississippi

There are, however, other and more plausible scenarios. Forthcoming proposals, of course, cannot be forecast in their particulars. Therefore, let us select one with as favorable an outlook for economic and political feasibility as is likely to be devised. If this scheme cannot qualify, it is hard to imagine any that can.

First, we may as well dismiss the Colorado Basin as a candidate for Great Lakes water. Plans have already been hatched there for drawing further on the waters of northern California and the Pacific Northwest. Instead, let the lake waters play an indirect role in serving the less-distant High Plains east of the Rockies, there to compensate for the decline of the Ogallala Aquifer.

The direct source of new waters for the High Plains might well be their own rivers, that is, the western tributaries of the Mississippi, principally the Missouri and the Arkansas. But, too large a demand on these tributaries would leave a deficiency in the main stream of the Mississippi. Enter, the Great Lakes. Any deficiency in the Mississippi could be corrected by increased releases from Lake Michigan at Chicago via the Illinois River.

A plan of this kind would appear less "outlandish" and would, therefore, have a better chance of adoption. New dams on western tributaries, such as the Platte or the Upper Missouri would be at elevations approximating those of the fields their impoundments would water and so would require only limited pumping. Distances would be short. The existing Garrison Reservoir in North Dakota, for example, is at an elevation 1,264 feet higher than Chicago. Nature has already done the pumping.

But, do the Missouri and its tributaries have any water to spare? The western basins are afflicted with alternating drought and devastating floods. Flows are, thus, wildly variable. If these rivers have water to spare, it will have to be captured behind dams during the flood seasons and gradually released when the flow subsides.

The Missouri, the Arkansas, and their tributaries are already among the most dammed rivers in the world. Yet, the presumption is very strong that they still have dam sites with water to spare. In 1985, the Missouri discharged 59.9 usable acre-feet into the Mississippi near St. Louis, nearly three-fold the total water withdrawals on the High Plains. Airline travelers from the east, flying over the Mississippi on their approach to the St. Louis airport, may note the wide band of muddy water hugging the west bank. They are looking at Iowa and Nebraska real estate brought downstream by the Missouri. There are now no dams on the Missouri below Yankton, South Dakota, 811 river miles above the mouth, and most of the discharge at St. Louis is precipitation from this reach.

Additional dams and other works on the Missouri River and its tributaries, upstream from Yankton, are already under consideration. The proposed Fort Benton Dam, High Cow Creek, and the O'Neill projects are illustrative. The Garrison Diversion project in North Dakota would provide more water for irrigation. The construction of a new dam at The Narrows on the South Platte, a major tributary of the Missouri, or at the confluence of the South Platte and the North Platte remains under evaluation. Others might be cited.

Admittedly, dam building in the West has been slackened in recent years. This is largely because of western resistance to the higher charges for water use and to increased local financing urged by the Reagan administration. But, the growing shortage of water may weaken this resistance, especially with the possible return for a few years of Dust Bowl conditions. Indeed, the project at the confluence of the South Platte and the North Platte Rivers would be built by the Denver Water Board, a financing somewhat harmonious with the Reagan policy.

It appears, therefore, that the Missouri and its tributaries still have water to spare to be caught by more dams in high-water seasons, either in the reach below Yankton or in the higher elevations where such projects are already on the drawing board.

The Middle Mississippi

The potential adverse impact on waterborne commerce on the Mississippi is substantial. The muddy band from the Missouri helps the Mississippi carry an enormous tonnage of freight. The Middle Mississippi extends southward from the Missouri's mouth 195 miles to Cairo, Illinois, where the huge Ohio River pours into the Mississippi a mass of water large enough to correct most deficiency from there to the Gulf. The metropolitan area of St. Louis, with a 1984 population of 2.4 million, fronts on the Middle Mississippi, including, on the Illinois bank, one of the nation's major oil refining centers. The governing channel draft in this reach in nine feet, and any substantial shortfall would be a matter of national concern.

The Middle Mississippi is one of the most densely used waterways in the world. Moving traffic 12 months of the year, in 1985 it carried 18,421 flotillas of barges, averaging 5,031 tons of cargo each—mostly long halls—and connecting such cities as Minneapolis, Pittsburgh, Kansas City, Chicago, New Orleans, and Houston in a continuous flow, including in its cargo export grain, coal, petroleum fuels, chemicals, fertilizers, building materials, steel, and a wide variety of processed and fabricated products. The total tonnage carried was more than twice that on the St. Lawrence Seaway and growing.

The flow of the Mississippi is also a bulwark against excessive salinity in Gulf coastal waters. The low-lying city of New Orleans is especially vulnerable, and it is reported that releases from as far away as the Fort Peck

Dam on the Missouri in Montana have served to repel costly salt water intrusion in the New Orleans water supply.

Small diversions from the Missouri to the High Plains would not significantly affect the navigable draft in the Mississippi. But, large ones would be very serious, especially in years of low water. As depletion of the Ogallala Aquifer continues, compensating diversions would become progressively greater and could well pose a crisis not long after the turn of the century. If diversions from the Missouri River had replaced the Ogallala withdrawals in 1963 (a low-water year), the Missouri's discharge at St. Louis would have been reduced by about 38 percent. Even in 1985, a high-water year, this reduction would have been 18 percent. The effect on shipping draft of such reductions, or of even larger ones in years of unpredictably low water, would impose shipping costs on most of the Mississippi Basin and the Gulf Coast running into many millions of dollars.

This is the damage which might be averted by additional releases from the Great Lakes. An attendant problem would be that of flood control on the Illinois River. In low-water seasons on the Middle Mississippi, the withdrawal from Lake Michigan at Chicago could well reach 15,000 to 20,000 cfs, in comparison to the present yearly average of 3,200 cfs, posing a flood hazard for downstream communities and farm lands. Therefore, a sound evaluation of diversion from the lakes should take into account, not only the higher lake shipping costs and the impairment of hydropower we have noted, but also the cost of additional flood control on the Illinois.

Alternatives to Diversion

We appear, then, to be confronted by a dilemma. Diversion from the lakes would impose severe costs on the lakes region. But, with depletion of the Ogallala, western farmers are facing progressive aridity of their lands. Water is a necessity of life. Congressman Wright says: "Pure water, when and where you need it, is worth whatever it costs to get it there." Should not the lakes be required to accept the costs in order to avert disaster in the West?

But, in the West, the alternative to diversion is not actually disaster. The sinking water table of the High Plains is a slow process; Ogallala depletion is widely recognized; and ample time is thus available for adjustment. Other sources of water remain. The average yearly precipitation in eastern Colorado, for example, is 16 inches—about one-half the national average. The numerous reservoirs built by the Bureau of Reclamation and other agencies since World War II now capture and distribute more of this runoff for farm use than ever before.

Irrigators on the High Plains can use water more sparingly without equivalent loss of production. Present federal subsidization rewards profligacy. The National Water Commission observes, "The water users on some modern Federal Reclamation projects, for example, repay no more than 10 percent of the construction costs attributable to irrigation."

With water virtually free, irrigation management concentrating on the "bottom line" has little incentive for thrifty application. Present spraying systems entail large losses to evaporation and, applied to row crops, feed water unproductively onto muddy ground. Crops requiring large quantities of water per dollar of value are cultivated where more water-thrifty crops could grow. In some areas, irrigation could be reduced to a supplemental role. Admittedly, over the long run, some acreage would have to return to less-rewarding dry farming and some reassigned to grazing. The adjustment would not be costless, but it need not be disastrous.

In a national perspective, no future shortage of foodstuffs or fibers presently discernable can justify transfers from the lakes. The crops flourishing on Ogallala waters include cotton, alfalfa, wheat, sugar beets, corn, and sorghum, some of these overflowing the nation's storage bins and subject to price supports and output controls. Indeed, subsidized reclamation projects on the High Plains are damaging to farm interests in the better-watered regions of the country, such as the Corn Belt, depressing farm prices with excess supply.

Monitoring Western Developments

Spokesmen for lake interests may fail to perceive the implications with respect to the Great Lakes of a program along the lines of the one we have sketched. The program would proceed over many years. In its initial and intermediate stages, it would bear no ostensible relationship to the Great Lakes. Proposed new dams on the Missouri and its tributaries are in the distant West and in another drainage basin. Even the prospective threat to navigation drafts in the Middle Mississippi would not be readily evident, concealed in the uncertainties of flow variation. At the extreme, flows on the Missouri vary as much as 200-fold, whereas both official project evaluation and public discussion tend to focus on normal, recent, or average discharges.

But, at a later date, after completion of a number of the Missouri River works, the inevitable arrival of a season or a series of seasons of western drought and consequent low water on the Middle Mississippi, with its attendant damage to the river's commerce, would at last engender pressures for increased releases at Chicago. By this time it would be too late for opposition to the High Plains dam-building program. The dams would already be in place, and the conflict would have moved downstream, pitting the interests of Mississippi shipping directly against those of the Great Lakes. The western irrigators could stand aside as uninvolved. They would have their water.

Water resource issues are no longer local—nor even regional. Impacts reach for thousands of miles. Releases from the Fort Peck Reservoir in Montana freshen the drinking water in New Orleans. Water originating from a summer shower in Duluth pours through penstocks in Quebec. The massive tonnages of freight transiting the lock-and-dam structures on the Ohio near Cairo, Illinois, weave the distant industrial complexes of Pittsburgh and Houston into an integral logistical system.

Whatever concepts of relief may emerge, no matter how modest their scale, the Great Lakes communities cannot afford to disregard developments on the western plains. In association with increased interbasin connections, the water resources of North America progressively merge towards a single lode of continental dimensions. The High Plains farmers are beginning to eye the Great Lakes, and the people of the Great Lakes region would do well to return their scrutiny.

Martin J. Barloon is Carlton Professor Emeritus of Economics, Case Western Reserve University.

Kalman Goldberg and Robert C. Scott

The Effect of Property Taxes, Public Benefits, and Amenities on Neighborhood Housing Prices

This article summarizes a study done to estimate the impact of property taxes, selected public services, and amenities on the price of single-family residential housing in a city.

A common observation, formalized in economic theory, suggests that gains from differences in property taxes and benefits associated with particular municipalities are short-lived. Careful searchers among potential buyers of single-family residences note these disparities. The high demand for the bargain properties, in those municipalities in which taxes are low relative to benefits, raise their prices. The saving in tax payments are offset by the loss of future income from the capital invested in the higher priced property. The obverse occurs in the high tax/low benefit municipalities. This market process of capitalization has the long-run consequence of eliminating disparities. In brief, you get what you pay for as people "vote with their feet" and, thus, alter housing prices.

Economists have conducted numerous tests of this process to determine whether some of the differentials in housing values among cities can be explained by differentials in property taxes and the level of local government expenditure. With virtually no exceptions, these studies took municipalities as their subject. They compared tax rates and benefits in each during a given year or in some cases in two years. They estimated "coefficients of capitalization," the price differential resulting from differences in a dollar of property tax per standard unit of housing or from a dollar difference in expenditures for provision of public services.

Our study differs in important respects. It poses some different questions, offers some different conclusions, and uses a somewhat improved methodology. We do not take the municipality as the unit of our observation. Instead, our interest is in determining how housing prices in different neighborhoods are affected by the same tax and benefit actions of their common political jurisdiction. Does capitalization remove the fiscal disparities *within* a city, or are high- and low-income neighborhood housing prices affected differently? If so, are there revenue sources other than the property tax that might narrow the differences that offer more equal treatment?

The jurisdiction selected for the study is the city of Peoria, Illinois. Its population during the study year was approximately 124,000. It is comprised of a wide range of income classes and diverse neighborhoods. Blacks make up about 19 percent of the population and hold about 8.5 percent of the owner-occupied dwellings. Socioeconomic segregation by neighborhoods was, and remains, marked. The data base is comprised of all the 817 individual single-family residences sold during

1979 within the city. Each house is assigned its own structural characteristics, the characteristics of the census tract neighborhood, and high school attendance area in which it is located.

The Capitalization Relationships

The study tested the following relationship. The percentage change in the selling price of a single-family residence depends on changes in effective property tax rate, net of shifting (an increase in the tax rates reduces price); the average score on the college entrance examination (higher scores raise price); the average use of the main and branch libraries (higher use raises price); the percentage of nonwhite residents in the census tract (higher percentages lower price); the crime rate in the neighborhood (high crime rates lower price); and the bundle of housing characteristics of each single-family residence in the sample. Amount or quantity of housing is measured as multiples of the structural characteristics of each residence. This permits the isolation of the differences in the structure or quantity of house from other variables that influence its prices, such as location.

The sale price of the house in 1979 is its market value. Data on selling prices and individual housing characteristics were provided by the Multiple Listing Service (MLS). The study uses a micro data base, the sample including every single-family residence sold in the city in 1979.

The effective tax rate is the actual dollar amount of tax levied, adjusted for shifting as a federal personal income tax deduction, as dollars of tax per $1,000 of market value of the house. The dollar amount of taxes were taken from the MLS records for each house sold in the area. The Internal Revenue Service provides data on marginal tax rates by adjusted gross income classes. It also provides data on the percentage of each income class that itemizes property taxes as a deduction. The income of each household was assumed to be that of the average income of its census tract of residence. The appropriate marginal tax rates were assigned to residences in the study in all the tracts. This marginal rate was adjusted by the percentage in that income class that actually itemized the property tax. The effective tax rate, then, is derived with the dollar tax levy reduced by the amount shifted. Failure to make this adjustment, increasingly important as income and housing values rise, would exaggerate the true tax cost and bias the capitalization rate.

All else equal, a higher property tax rate reduces value. The actual dollar effect on price depends on the size of the coefficient and the individual characteristics of the house and its neighborhood.

The average ACT score for each of the city's four high schools was provided by the school district. The high school attendance area of each residence is part of the MLS data, thus high school ACTs were associated with each house. The school boundaries are much larger than census tracts and are, therefore, less homogeneous. Nevertheless, the quality differences are significant and are so perceived by residents. The expected sign on ACT is positive—higher quality high schools attract buyers to their attendance areas, raising housing values.

Data for library use were collected by a survey of all users during four weeks at separate times of the year. Addresses of users were sorted by census tract and the tract average library use was assigned to each house within the tract. The coefficient is expected to have a positive sign. It is a desirable service for higher income families who can be expected to pay more for a house where library services are available. On the other hand, low income families, infrequent users of the service, are not expected to be willing to bid up the price of a house because there is a good library service.

Data on racial composition are those reported in the 1980 Census of Population. Each house was assigned the nonwhite percentage of its census tract. The neighborhoods with high concentrations of black residents are also the older and poorer residential areas. The residences of higher income blacks are distributed in the community at large, and whatever racial prejudice exists is diluted. It is expected that a higher percentage of nonwhite residents would have a negative effect on price.

Data on crime were provided by the Peoria Police Department from their computer records of police calls. These were sorted by census tract. Each house is assigned the crime rate value of the census tract in which it is located. It is expected that the coefficient measuring the effect of neighborhood crime on housing prices would be negative. One would not expect families to be willing to pay more for a house because their taxes are going to support a high level of police activity in response to a high crime rate in the neighborhood. On the contrary, the disamenity would be capitalized as well as the tax to pay for the police.

The specific structural characteristics of each house are included in the regressions as 31 separate variables. The data were part of the MLS information on each house sold. The inclusion of this rich store of data avoids bias errors in the estimation of capitalization effects of the variables identified earlier.

As the explanation of these variables suggests, their effect on housing prices is more complicated than prior aggregate tests indicate. Some publicly provided services (for example, libraries) are clearly superior goods but the demand for them and their influence on housing demand is positively correlated with income. In contrast, some services are inferior goods (for example, police services that are positively correlated with high crime) and their use, not through choice, is inversely related to income. Based on these considerations, one would expect the empirical analysis to demonstrate that the net effect of capitalization of taxes and public services is to lower the price of a unit of housing more in the poor neighborhoods than in the higher income ones.

In summary for poor neighborhoods: (1) Crime (greater use of police services) lowers price. Tax cost for police services lowers price. There will be a larger relative effect in poor neighborhoods with low income because of their lower marginal tax rate for property tax deduction; (2) Library: little used and, therefore, little positive effect on price. Tax cost lowers price, same as 1; and (3) High school: poor quality school with little or no positive effect on price. Tax cost lowers price, same as 1 and 2.

For high-income neighborhoods: (1) Crime (little use of police services), little positive effect on price. Tax cost lowers price, but tax cost dollar-for-dollar relatively less due to more shifting; (2) Library: higher use raises price. Tax cost lowers price, same as 1. However, tax cost is further reduced by cross subsidy from lower income households who are taxpayers but nonusers; and (3) High school: high quality, raises price. Tax cost lowers price , same as 1.

Empirical Test of Neighborhood Capitalization

The results of the testing are presented in Table 1. They confirm the anticipated results of the effect of each of the independent variables on the price of a standard unit of housing. Also confirmed is the differential impact of these variables depending on neighborhood location of the house. As expected, the effective tax rate had a negative effect on price and was statistically highly significant.

The coefficients of benefits, high school quality, and racial composition estimate changes in housing value associated with percentage changes in each of these variables. The actual net capitalization effect of tax payments and the use of publicly provided services (inferior and superior) varies within the city jurisdiction. Prices for a standard unit (a standard quantity isolated from other than structural influences) of housing are higher in the higher income neighborhoods and lower in the poorer ones. This is, in part, due to the cross subsidy that exists due to the fiscal disparity between the after-shifting tax payments (negative capitalization) and the net benefits from superior (positive capitalization) and inferior (negative capitalization) characteristics.

Table 2 contains data for hypothetical low-, middle-, and high-income households and estimates of the net capitalization for each computed as the offsetting effects of tax capitalization and benefits capitalization. Income, the effective tax rate, and other data for household number 1 are based on averages for census tract 2. Household number 1 has $13,984 of income. Its effective tax rate is 15.60. This rate was computed as the average dollar amount of property tax paid per $1,000 of selling price for homes sold in tract 2.[1] Household 1 shifts .043 of its property tax to the federal government as a federal income tax deduction, leaving a net effective tax rate of 14.93. The capitalization effect of net taxes paid is based on the city-wide capitalization regression coefficient, which was then applied to household 1. Relatively minor assessment imperfections aside, the capitalization effects among the households are due to the differences in their ability to shift part of their tax burden to the federal government. As shown in Table 1, each dollar of net effective tax rate reduces the natural logarithm of the house price by .0303. Alternatively, a $1 increase in the property tax rate from $14 to $15 (per $1,000 of value) reduces the property value by almost 3 percent. The impact of the full 14.93 net tax rate reduces the price of the house by 36.4 percent. The net capitalization rates of taxes for all three household types are shown on line (3), Table 2.

For household 1, the average ACT score, percent nonwhite population, police calls, and library usage are those of tract 2. Households 2 and 3 were constructed similarly with usage data from census tracts 20 and 29.[2] Capitalization percents for each variable were found by multiplying the values of these variables by their respective capitalization rate coefficients (as estimated in the city-wide capitalization regression, shown in Table 1). The net capitalization of taxes and benefits together is the sum shown on line (8), Table 2. The calculation of the figure is shown at the end of Table 2.

Table 1. Impact of Property Taxes, Local Government Services, and Neighborhood Traits on Housing Values

Dependent Variable: Natural Logarithm of House Price

Independent Variables	Coefficient Estimates
Net Property Tax Rate	−.0303
High School ACT	.0164
Percent Nonwhite in Census Tract	−.0040
Police Calls (serves as a proxy for crime rate)	−.0001
Library Usage	.0013

Each coefficient indicates the percentage change in the value of a house brought about by a one unit change in the independent variable. For example, if the net property tax rate increased from $14 to $15 per $100 of value, the value of the house would decrease by 3.03 percent.

The estimates are all statistically significant at the 5 percent significance level and the full regression explains over 75 percent of the variation in the house values in the sample.

Table 2. Examples of Net Capitalization Results

	Low	Middle	High
(1) Income	$13,984	$23,928	$36,773
Effective Tax Rate	15.60	14.60	16.50
less: Shift Rate	.043	.143	.304
(2) equals: TAXNET (Net Effective Tax Rate)	14.93	12.51	11.48
(3) TAXNET Capitalization	−36.4%	−31.5%	−29.4%
(4) ACT of High School	16.5	19.1	20.8
(5) Percent Nonwhite in Census Tract	35.2	10.0	2.1
(6) Police Calls (serves as a proxy for crime rate)	656.0	691.0	695.0
(7) Library Use	3.8	25.4	85.0
(8) Net Tax/Benefits Capitalization ((3) + (8))	−32.3%	−13.8%	+1.9%

The following example indicates how the net tax/benefit capitalization effect (line 8) is calculated for low income households (column 1).

Net Tax Capitalization

$$\ln(\text{Price}) = 14.93^{*}(-.0303) = -.452379$$

$$1 - e^{-.452379} = 1 - .636 = .364$$

Net Tax/Benefits Capitalization

$$\begin{aligned}\ln(\text{Price}) &= 14.93^{*}(-.0303) + 16.5^{*}.0164 \\ &+ 35.2^{*}(-.0040) + 656.0^{*}(-.001) \\ &+ 3.8^{*}.0013 \\ &= -.390\end{aligned}$$

$$1 - e^{-.390} = 1 - .667 = .323$$

This number indicates that an increase in the property tax rate by $1 per $1,000 of market value reduces the value of the house by 3.23 percent of the house value, all else equal. For example, a $35,000 house would be expected to decline in value by about $1,000.

The results show dramatically different capitalization effects of the local fiscal system. All effects (other than specific characteristics of the house itself), taken together, cause the value of household 1's house to be reduced by 32.3 percent. Household 2 has higher income, shifts more of the tax and has better neighborhood amenities. It loses only 13.8 percent of the value of its home. Household number 3 actually gains house value because potential home buyers in its neighborhood can shift a large portion of property taxes, and because neighborhood amenities are beneficial. In fact, the results for high income households may be even better in some cases where shift rates reach the 50 percent marginal federal income tax rate.

Conclusions

In the world of Tiebout economic theory, each municipality is homogeneous, and differences in tax/benefit bundles are capitalized away. This study addressed the assumption of intrajurisdictional homogeneity and finds, at least for the city examined, that significant disparities exist. Households do indeed move to locations in an attempt to maximize their net tax/benefit interests. However, the consequences do not equalize but rather exacerbate neighborhood differences.

Differences in net tax/benefit capitalization rates are rooted in socioeconomic differences and concentrated into neighborhood disparities by housing segregation. High income households (and, therefore, neighborhoods) enjoy a lower effective tax rate and a smaller negative capitalization dollar-for-dollar of levy because of the federal tax deduction. Similarly, good schools and low crime rates raise housing prices in their neighborhoods. In low income neighborhoods the opposite occurs.

As suggested in previous studies, there are impediments to mobility and socioeconomic desegregation. Zoning barriers exist to prevent housing that is low enough in cost to accommodate low income households. Racial discrimination and overlapping taxing jurisdictions such as park districts and airport authorities preclude an escape from burdensome fiscal disparities anywhere in the larger area, reducing incentives for the poor to move. Technically, one might expect that high income families would move to low income neighborhoods, bring their lower effective tax rate with them, and pick up housing bargains. However, even if suitable housing stock were available, the negative capitalization effects of the disamenities would outweigh the gain. We do, nevertheless, see some reverse mobility when neighborhoods have deteriorated in the extreme. Housing bargains due to capitalization result in gentrification.

An obvious remedy to the differential capitalization rates by socioeconomic class is a reduction in the property tax itself and the substitution of other revenue sources.[3] One possibility is the imposition of user fees for publicly provided services that are not pure public goods. Low income households who do not choose to use the service need not pay for it. The property tax relief would be capitalized into all housing prices, and the cost for higher income households would be shifted to a direct consumption expenditure. Each dollar of property tax reduction would be more beneficial to lower income households since they enjoy lower tax shifting rates.

An estimate of the total impact on housing prices of the combined effects of property taxes and all publicly provided services, both superior and inferior, requires a study more exhaustive than this one. The results here are merely suggestive and indicative. The further influence on housing prices of private and not-for-profit institutions (for example, shops, noxious drive-ins, churches, YMCA) might also be revealed by this type of study and would offer practical uses for such purposes as zoning decisions.

Notes

[1] Since the tax levy on all houses in the city is identical, the effective tax rate for the three households would be the same if assessed valuations perfectly mirrored sale prices.

[2] These three tracts were used as representative of low-, middle-, and high-income groups in a previous study by the authors (1986).

[3] Of course, the elimination of the property tax deduction from federal income taxes would serve a similar purpose.

Kalman Goldberg and Robert C. Scott are professors of economics at Bradley University, Peoria. *Support for this project was provided by the Office of Real Estate Research, University of Illinois at Urbana-Champaign. The authors wish to thank James R. Follain for his helpful comments and Phillip Inslee, research assistant, for his help with data processing and programming. A full description of the research for this article is available as ORER Working Paper No. 45 from the Office of Real Estate Research, 304 David Kinley Hall, 1407 West Gregory Drive, Urbana, IL 61801.*

Illinois Business Indexes

Recessionary pressures have eased. As Chart 1 illustrates, the current indicator rose above the trend indicator in both December 1987 and January 1988. As a rule of thumb, the movement of the current indicator above the trend indicator for four consecutive months presages a period of future economic growth.

The current upswing has been fueled by a continuing expansion of Illinois nonagricultural employment (Chart 2) and an increase in the state's personal income tax receipts (Chart 3). Though residential housing permits have experienced a general downward drift since December 1986, the 66 percent increase in December 1987 was a major factor in the rise of the current indicator (Chart 4). Residential housing permits fell in January 1988, and the Illinois building industry indexes remain below their January 1987 levels (table of Illinois Business Indexes).

Inflationary pressures also decreased. Since October 1987, the percent change in the north central Consumer Price Index (CPI) has fallen (Chart 5). This decline was present in both the Chicago and the St. Louis CPI indexes. In January, the St. Louis index change was greater than the Chicago change, thereby reversing an earlier trend where the St Louis inflation rate was below the Chicago rate (Chart 6).

As of January 1988, the United States Department of Commerce revised the base year for the Consumer Price Indexes to 1982–84, and we have adjusted the relevant series in the table of Illinois Business Indexes accordingly.

ILLINOIS BUSINESS INDEXES

	Percent Change Jan 1987 Jan 1988	*Jan 1988*	*Dec 1987*	*Nov 1987*	*Oct 1987*	*Jan 1987*	*Dec 1986*
Leading Indicator (Current Indicator)	−0.74[a]	13.90	11.73	9.63	9.69	14.64	11.10
Leading Indicator (Trend Indicator)	0.45[a]	11.67	10.83	10.35	9.85	11.22	9.16
Employment-manufacturing (in thousands)[b]	1.71%	938.1	936.8	934.6	934.1	922.3	922.2
Average weekly hours-manufacturing[b]	1.69%	42.0	42.4	41.9	41.5	41.3	41.6
Weekly earnings-manufacturing[b]	7.94%	$480.10	$481.60	$452.94	$448.62	$444.80	$446.37
Help wanted advertising-Chicago (1969 = 100)[c]	18.37%	116	108	115	115	98	121
Help wanted advertising-St. Louis (1969 = 100)[c]	4.48%	70	68	71	68	67	62
Retail sales (in millions)[d]	0.74%	$4,928	$7,411	$5,977	$5,965	$4,892	$7,209
Coal production (in thousands of tons)	−6.29%	4,836	5,083	4,201	5,750	5,229	4,882
Petroleum products (in thousands of barrels)[b]	2.50%	2,050	2,100	1,810	2,000	2,000	2,110
Vendor performance[e]	23.64%	68%	71%	66%	70%	55%	56%
Building permits (in thousands)							
Residential housing units	−37.32%	1.416	2.513	2.273	3.008	2.259	2.971
Value of residential housing	−26.46%	$119,906	$205,704	$276,488	$336,511	$163,055	$205,774
Value of nonresidential construction							
Industrial buildings	−41.33%	$7,496	$27,143	$40,119	$33,111	$12,776	$103,043
Office, banks, and professional buildings	−72.22%	$17,165	$26,725	$35,788	$80,276	$61,793	$24,216
Stores and other mercantile buildings	−46.74%	$13,003	$26,366	$44,238	$47,094	$24,415	$20,906
Other	−35.60%	$1,968	$2,059	$5,505	$8,077	$3,056	$2,865
Consumer price index (1982–84 = 100)							
North Central US	3.50%	113.4	113.3	113.5	113.5	109.6	108.8
North Central/population more than 1,200,000	3.40%	114.1	113.9	114.4	114.2	110.3	109.6
North Central/population 360,000 to 1,200,000	3.40%	113.3	113.0	113.0	113.0	109.6	109.0
North Central/population 50,000 to 360,000	3.80%	113.4	113.6	113.9	113.9	109.2	108.0
North Central/population less than 50,000	2.80%	110.6	110.9	110.5	110.5	107.6	107.0
Chicago	3.00%	115.3	115.7	115.7	115.1	111.9	110.8
St. Louis	3.10%	113.4	—	113.1	—	110.0	—
		1987:III	1987:II	1987:I	1986:IV	1986:III	1986:II
Personal income (in millions)[b,f,g]	5.98%	$189,809	$187,750	$187,233	$180,304	$179,096	$179,622
Per capita personal income[b,f,g]	5.68%	$16,357	$16,191	$16,157	$15,571	$15,477	$15,534

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, January 1988. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Seasonally adjusted at annual rates. [g] Percent change between 1986:3 and 1987:3.

Chart 1. Composite Leading Indicators (average percent change in base indexes)

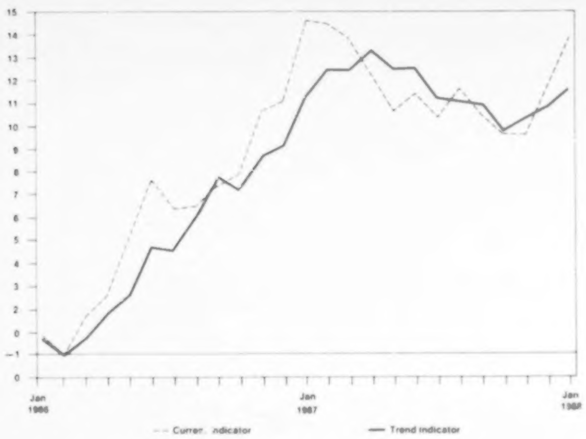


Chart 2. Illinois Nonagricultural Employment (seasonally adjusted)

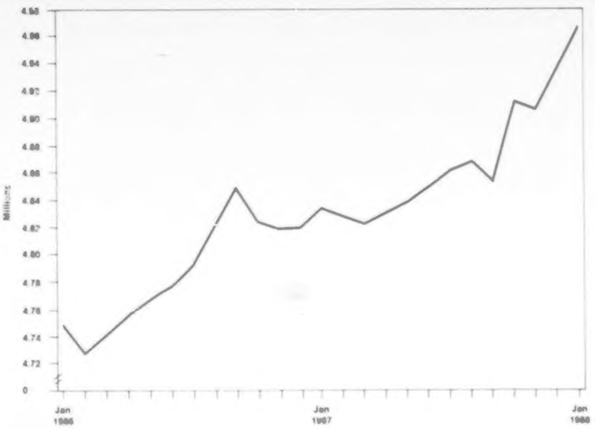


Chart 3. Illinois State Personal Income Tax Receipts (seasonally adjusted)

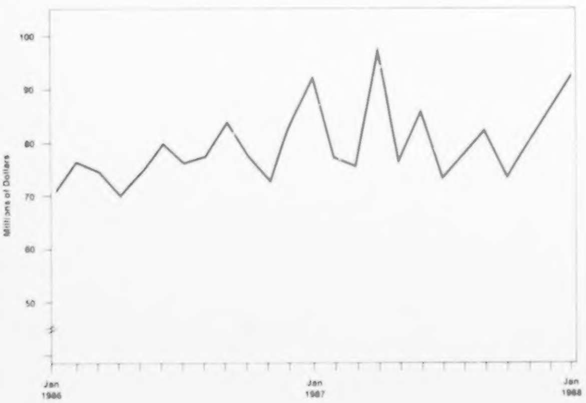


Chart 4. Illinois Residential Housing Units (seasonally adjusted)

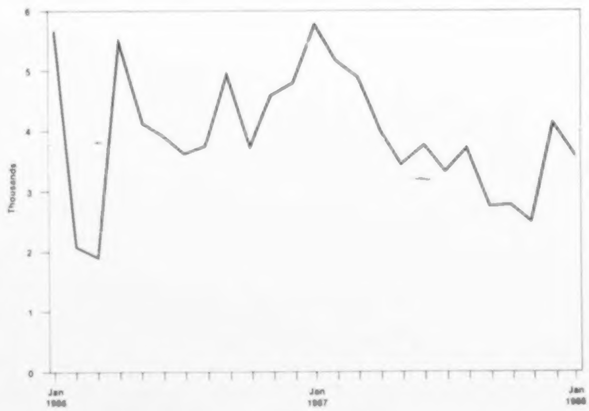


Chart 5. Year-to-Year Change in North Central CPI-U Index

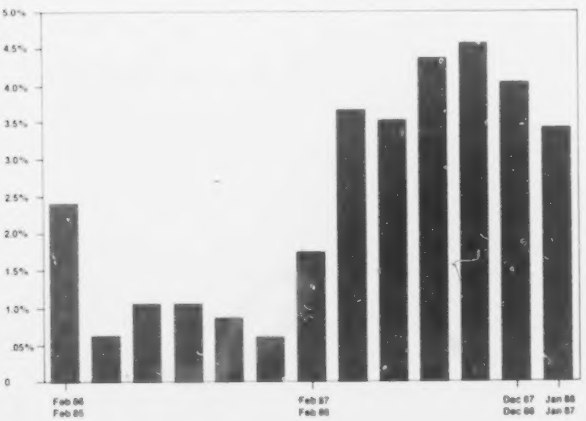
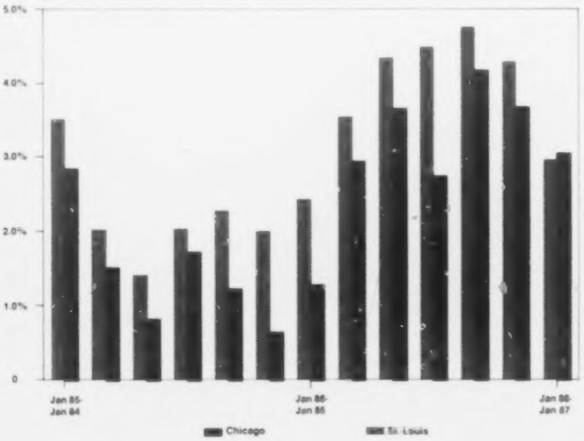


Chart 6. Year-to-Year Change in Chicago and St. Louis CPI-U



Second-class postage paid at Urbana, Illinois

Illinois Business Review

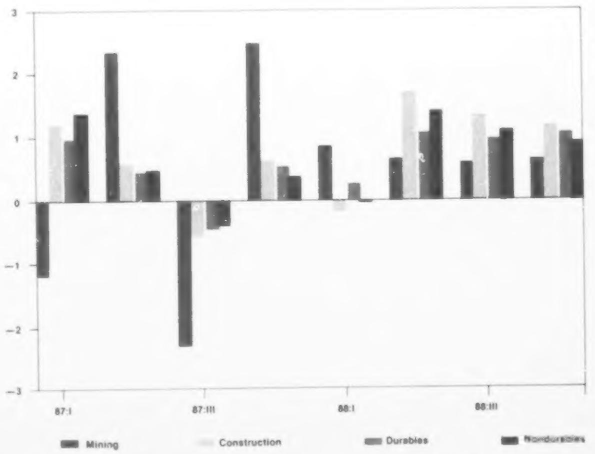
Bureau of Economic and Business Research
428 Commerce West, 1206 South Sixth Street
Champaign, Illinois 61820

CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

Illinois Economic Outlook

The Illinois Econometric Model forecasts growth in average hourly wages during 1988 similar to the increases that occurred in 1987. During 1988, hourly compensation is expected to increase by 2.1 percent in mining, 1.5 percent in construction, 1.3 percent in durable manufacturing, and 1.2 percent in nondurable manufacturing. Actual changes in 1987 were 1.4 percent, 1.8 percent, 1.8 percent, and 2.8 percent, respectively. As the table indicates, wage increases can be expected over the forecast period in both durable and nondurable manufacturing sectors. The chart shows quarterly percentage changes in wages for 1987 and the expected changes forecast for 1988. Wage increases in the last three quarters of 1988 are expected to dominate the slow growth in the first quarter resulting in continued growth in hourly compensation for the economy as a whole.

Illinois Hourly Wages (percentage change from previous quarter)



Illinois Seasonally Adjusted Hourly Wages

	History				*Forecast*			
	87:I	*87:II*	*87:III*	*87:IV*	*88:I*	*88:II*	*88:III*	*88:IV*
Mining	$14.87	$15.22	$14.87	$15.24	$15.37	$15.47	$15.56	$15.66
Construction	17.42	17.52	17.42	17.53	17.50	17.80	18.04	18.25
Manufacturing	10.82	10.87	10.83	10.88	10.89	11.03	11.15	11.26
Durable manufacturing	11.07	11.12	11.07	11.13	11.16	11.28	11.39	11.51
Primary metals	12.69	12.82	12.69	12.82	12.90	13.08	13.22	13.35
Fabricated metals	11.04	11.06	11.04	11.08	11.02	11.02	11.06	11.12
Nonelectrical machinery	12.07	12.21	12.07	12.22	12.33	12.49	12.61	12.72
Electrical machinery	9.41	9.42	9.42	9.43	9.42	9.48	9.53	9.59
Miscellaneous durables	10.95	10.93	10.95	10.93	10.93	10.95	11.00	11.06
Nondurable manufacturing	10.43	10.48	10.44	10.48	10.48	10.63	10.75	10.85
Food products	10.51	10.46	10.52	10.46	10.44	10.51	10.58	10.65
Printing and publishing	11.40	11.50	11.41	11.51	11.57	11.71	11.82	11.94
Chemicals	11.60	11.71	11.60	11.71	11.73	11.76	11.75	11.76
Miscellaneous nondurables	9.12	9.13	9.12	9.14	9.16	9.26	9.32	9.40

Bureau of Economic and Business Research

7/8/88

U6910-1

June 1988
Volume 45, Number 3

Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

The Professional Football Strike / 03

Illinois Economic Update / 07

State Taxes / 09

June 1988

Illinois Business Review

Volume 45 Number 3

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Director, Robert W. Resek; *Acting Director*, Marvin Frankel; *Editor*, William R. Bryan; *Technical Editor*, Janet R. Fitch; *Designers*, Ronald Sterkel, Rajene Fry, and Kimberly Nyberg; *Research Assistants*, Paul C. Bishop, Gregory A. Gilbert, Martin Dwyer, Mary A. Laschober, and Anne E. Winkler; *Director of the Office of Real Estate Research*, James R. Follain.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide current information on business conditions.
Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.
The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois.

Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

HARVEY J. MILLER AND RANDALL W. JACKSON

The Impact of the Professional Football Strike on the Chicagoland Area

The recent flurry of activity stimulated by the move of the St. Louis Football Cardinals emphasizes the basic role of a professional sports franchise in regional industry. Judging from the various administrators and power brokers from various regions that actively court these franchises, this view is widely accepted. In addition to their value as civic icons, professional sports represent a major industry, and the cities that are fortunate enough to possess one of its few points of production can expect to enjoy significant economic benefits.

Like any other industry, a professional sports franchise will develop production linkages with other entities in the regional system. Each franchise requires inputs for which it must pay, thus injecting money into the regional economy. Similarly, its output will have a beneficial effect on other activities that provide complementary goods and services.

Also like any other industry, disturbances can and do occur in professional sports. Professional football recently experienced a labor strike, resulting in a distinct fluctuation in professional sports output. The strike provides an opportunity to examine the regional economic impact of these franchises. The objective of this article is to assess the impact of the recent pro-football strike on the Chicago area in particular and, more generally, on regional economies. Chicago was chosen for a number of reasons, not the least of which was access to a regional input-output model for the area.

In the next section, the particular situation of Chicago and the football strike will be discussed briefly, followed by a description of the input data estimation procedure. An explanation of the particular application of the input-output framework used in this analysis is followed by a final section presenting the impact-assessment results.

Chicago and the 1987 Football Strike

The Chicago Bears play home games in central Chicago's Soldier Field, which seats 66,030; and because each home game the Bears play is "sold out," this patronage figure is the normal production level from which football strike deviations can be measured. The 1987 strike lasted 24 days, from 22 September through 15 October, and affected games from 27 September through 19 October. The games of 27 and 28 September were cancelled outright, while the games of 4 through 19 October were conducted with nonleague member "replacement players." Attendance for these games was substantially down from normal.

The Chicagoland area itself was spared much of the brunt of the strike, because the Bears were scheduled to play away from Soldier Field for the first two weekends of the strike, when games were cancelled and attendance was at its lowest. The Bears did play at Soldier Field the second two weekends of the strike, and attendance was indeed markedly off the usual level (Table 1). Although the impact of the strike was not as severe in Chicago as in areas with a less fortunate game schedule, it was still substantial.

Table 1. Soldier Field Attendance, 27 September to 18 October

Date	*Game*	*Expected Attendance*	*Actual Attendance*	*Difference*
9/27	(away)	0	0	—
10/4	(away)	0	0	—
10/11	Minnesota	66,030	32,113	–33,917
10/18	New Orleans	66,030	46,813	–19,217
		Total Lost Patronage		–53,134

Source: Chicago Bears Ticket Office.

Data Estimation

To quantify the economic impact of the football strike, money flows both inside and outside the sports facility must be considered. Inside Soldier Field, money flows are generated through ticket sales and concessions. Outside the facility, patrons also purchase other goods and services, as well as transportation to and from the game. Less obvious, but also significant, is the fact that professional football players are paid large salaries that generate substantial consumption-related effects. Data estimation procedures are discussed later.

In-Facility Expenditures

Actual attendance figures for game days were provided by the Chicago Bears office, and these were subtracted from the usual attendance level to determine the number of patrons lost during the strike. The Chicago Bears ticket office provided the number of seats sold at each price level, so that a weighted average ticket price could be determined. Assuming constant proportions of patrons at each ticket price, the lost ticket expenditures were found by multiplying the weighted average ticket price by the number of lost patrons:

11 October: 33,917 × 18.05 = 612,201.85
18 October: 19,217 × 18.05 = 346,866.85

Data on lost concession expenditures were not available from the Bear's front office or from the licensed vendor for Soldier Field, apparently for competitive reasons. Suitably disaggregated estimates were drawn from a detailed survey taken of Atlanta Falcon patrons in 1972 (which also served as a basis for several of the out-of-facility expenditure estimates). Estimated annual concession revenues and patronage provided a source for per-person expenditures. This figure was updated using the 1987 to 1972 Consumer Price Index ratio. To adjust for spatial variations in expenditures, median family income for both the Chicago PMSA and Atlanta MSA as reported in the 1980 census were similarly proportioned and adjusted. The modified annual per person concession revenue multiplied by the number of patrons lost in the Chicago strike, to yield a total concession revenue loss in Soldier Field:

11 October: 33,917 × 3.16 = 107,177.72
18 October: 19,217 × 3.16 = 60,725.72
Total = 167,903.44.

Expenditures

Nonplayer salary expenditures lost outside of Soldier Field due to the strike are of two types: incidental expenditures and transportation expenditures. The Atlanta survey provided data on out-of-facility (but within the urban area) expenditures on three broad categories: food/entertainment, lodging, and shopping. The spatial and temporal updating procedure generated lost expenditure levels shown in Table 2. Recall that per-patron expenditures are *average;* patrons from distant locations would actually spend quite a bit more, while local patrons would tend to spend little if anything on lodging or shopping.

Table 2. Out-of-Facility Patron Expenditures

	Per Capita	*Lost Patronage 11 & 18 Oct.*	*Lost Expenditures*
Food/Entertainment	$12.60	53,134	$669,488.40
Lodging	5.00	53,134	265,670.00
Shopping	1.85	53,134	98,297.90

The impact on public transit and parking was derived from available Chicago-specific data. Other expenditures, such as gasoline or tolls, could not be estimated with sufficient confidence. The impact on public transit was based on a 1985 Market Facts Survey for Chicago's Wrigley Field, which found that 34.7 percent of all patrons at Wrigley Field use public transit to arrive at the game. Using this same proportion for Soldier Field, (53,134 × .347) 18,438 fewer public transit patrons spending an average of $1.40 (based on the Sunday "SuperTransfer" fare) yields a public transit revenue loss of $25,813.20.

Strike-related parking revenue estimates were based primarily on the number of parking spaces in lots normally used by Soldier Field patrons. The rates per space on game-days were known for some of the lots, but not for others. Thus, the weighted average rate for the known group was used as an estimate for the unknown group. This resulted in a potential aggregate level of revenues from these lots of $81,885 per game-day. For two game-days the total is $163,770.

However, since the Chicago Department of Planning report noted an oversupply of 6.02 percent of parking spaces on game-days, the two-day figure was reduced to $153,911.05. Lastly, since patronage at Soldier Field was down on 11 and 18 October by only 40.24 percent (in the aggregate), the final estimated loss of parking revenues due to the strike is $61,933.81.

Player Salaries

The final economic impact of the strike is the loss of football player salaries. The average football player is paid $230,000 annually, and there are 45 players on a team. Hence, aggregate consumption expenditures of these players is a significant component of economic impact. Although their weekly salaries for four weeks were forfeited, the National Football League did pay the replacement players for their services, albeit at a much lower rate. The replacement players were paid for a full four weeks, which partially offsets the regular player salaries. With the average regular football player paid $15,000 per week, and the average replacement player paid $4,250 per week, the loss in salaries due to the strike can be computed as:

(15,000–4,250) × 4 weeks × 45 players = $1,935,500.

This aggregate loss in salaries does not entirely feed into the regional economy as consumption: adjustments must be made for taxes and other nonconsumption expenditures. With regard to income tax (the largest and most easily quantified drain on salaries), a typical married taxpayer with the salary of the average professional football player pays an estimated tax bill of $78,489, or 34.13 percent of the gross salary. Deflating the lost salaries by this proportion, yields a total disposable income effect of $1,274,633.

According to the Bureau of Labor Statistics consumer expenditure survey data, the top quintile of consumers spend 39.83 percent of their after-tax income on relevant consumer items. This proportion factors out expenditures for items such as housing, which would not be affected by a temporary loss of income, as well as expenditures for insurance, pensions, and other personal taxes. This final adjustment provides the estimated loss in players' income expenditures of:

$1,274,663.84 × .398314 = $507,704.50

Methodology

The estimated direct impact does not provide a complete and accurate portrayal of the total economic impact of the 1987 football strike on the Chicago regional economy. Most notably, the data estimated represent only the initial impact of the strike and ignore the fact that money injected into a regional economy will "multiply" as it changes hands over and over again. In addition, the estimated data do not specify whether the particular initial impact stays within the region or is muted by "leaking" out of the region through a given sector's use of imported inputs. A more accurate depiction of the economic effects of the 1987 football strike on the Chicago regional economy was achieved by using the estimated direct impact as input to a single region input-output model; more specifically, the Multi-Scale Regional Input-Output Model housed at and operated by the Center for Governmental Studies at Northern Illinois University.

The study region for this analysis is the Chicago Bureau of Economic Analysis (BEA) region, a 23-county region centered on the Chicago metropolitan area that encompasses the northeastern quadrant of the state of Illinois and some contiguous counties in Wisconsin and Indiana. This definition of the Chicagoland area was chosen to provide the maximum degree of closure for the input-output model, which is best applied in relatively closed regions. In addition, since professional football franchises are relatively dispersed across the country, the "hinterland" of a particular franchise is more likely to be regional in scope than urban or even metropolitan, despite the city-specific team label.

Table 3 provides a summary of the direct impact data. In-facility expenditures were captured using a final demand translator specific to the operation of commercial sports facilities. This translator distributes the disturbances across a pattern of industrial sectors that are known to be structurally linked to commercial sports facilities and apportions demand changes to regional and external sources using regional purchase coefficients for each industry sector. In contrast, the out-of-facility expenditures and salaries are fed into the model as direct output changes, since they are known to occur within the region. Also note that only 54 percent of the parking expenditures are used as input to the model, because as an industry, parking per se does not have as well-defined a structure of inputs and outputs as other industries. Land and labor and built capital are the only real input, and it was assumed that parking revenues would feed directly into household income adjusted for relevant consumption using the Bureau of Labor Statistics consumer expenditure data in a manner similar to the adjustment of player's salaries. However, in this case the income was treated as before-tax income and was adjusted using the average expenditure patterns of all consumers.

Table 3. Input Data Summary

In-Facility Expenditures	
Tickets	$ 959,068.70
Concessions	167,903.44
Total	$1,126,972.14
Out-of-Facility Expenditures	
Food/Entertainment	$669.488.40
Lodging	265,670.00
Shopping	98,297.90
Parking ($61,933.81 × .539466)	33,411.18
Public Transit	25,813.20
Player's Salaries (after tax and consumption)	$507,704.50

The strike effects are short. The input-output framework, however, is better suited to longer term effects or permanent changes. Thus, some of the wage and employment sectors estimated by the model may be overstated, since one would not expect salaried or contracted workers to lose income or employment after only a four-week downturn. This will also effect the model's estimated total impact, which includes direct, indirect, and income-induced effects. In contrast, certain wage and employment effects are not overstated, since many affected workers do rely upon commissions directly related to the sporting event. Hence, it is suggested that the total impact estimated is only slightly higher than a medium-strength effect.

Results

From an initial impact estimate of $2,727,400, $2,337,100 were estimated by the model to be region specific. Therefore, $390,300 of the initial loss due to the strike occurred outside the defined region. This leakage was accounted for by the in-facility expenditures, only 65.37 percent of which remained within the region.

A summary of these effects is presented in Table 4. The (direct, indirect, and induced) impact of the strike on the Chicago regional economy was over $2.9 million in output and more than $1 million in wages. The regional economy suffered a corresponding loss in value added of nearly $1.7 million with value added defined as employee compensation, profit, interest, capital consumption allowance, and indirect business taxes.

Table 4. Total Effect of the 1987 Football Strike on Chicago BEA *($ millions)*

	Output	*Wages*	*Value Added*
Agriculture	0.009	0.002	0.004
Agriculture Service, Forestry, and Fish	0.009	0.004	0.004
Mining	0.002	0.000	0.001
Construction	0.063	0.041	0.049
Manufacturing	0.171	0.027	0.050
Transportation and Public Utilities	0.228	0.046	0.114
Wholesale	0.113	0.047	0.080
Retail Trade	0.656	0.235	0.374
Finance, Insurance, and Real Estate	0.361	0.070	0.260
Services	1.277	0.562	0.755
Government	0.023	0.006	0.011
Total	2.911	1.041	1.701
Multipliers	1.735	1.563	1.762

The input-output framework clearly captures the multiplying effect that occurs as money enters the regional economy. These system-specific multipliers for professional football in Chicago are shown as the last entries of the column in Table 4. Thus, for every $1.00 in initial output disturbance that was caused by the football strike, an additional loss of approximately $0.74 will occur. Similar relationships are represented through the wage multiplier (1.563) and the value-added multiplier (1.762).

Table 5 summarizes the industry sectors that were most affected by the strike, sorted by value added. The top three are consistent with intuitive expectations: amusement and recreation services, eating and drinking establishments, and hotels and other lodging, with amusement and recreation by far the most affected sector in terms of output. Perhaps a bit more surprising is the fourth most affected sector in terms of output: real estate. However, the central position of real property owners and operators to the rest of the football-related activities is easily demonstrated. Land, and especially land in prime locations, is an integral part of both the sports facility itself and the other activities linked to the activity in the facility. Thus, the real property agents intercept money flows in this system in the form of rent, even in the short run since commercial leases can specify a percentage of gross monthly revenues as part of the rental payment.

Table 5. Total Effect of the 1987 Football Strike on Chicago BEA *($ millions)*

Sorted by Value Added

	Output	*Wages*	*Value Added*
Amusement and Recreation (79)	0.607	0.285	0.380
Real Estate (65)	0.212	0.014	0.170
Eating and Drinking Places (58)	0.388	0.099	0.167
Hotels and Other Lodging (70)	0.299	0.140	0.158
Health Services (80)	0.088	0.042	0.058
Apparel and Accessory Stores (56)	0.072	0.037	0.056
Wholesale-Nondurable Goods (51)	0.071	0.030	0.050
Special Trade Contractors (17)	0.063	0.041	0.049
Business Services (73)	0.091	0.025	0.044
Electric, Gas, and Sanitary Service (49)	0.117	0.013	0.043

Discussion and Conclusion

Although the Chicagoland region was spared much of the brunt of the effects of the 1987 football strike due to its game schedule, it is clear that even with this relatively minor disturbance, some substantial economic impact did occur. Despite the disturbance of only two game days and an aggregate loss of only 40 percent of the patronage on those days, a total loss to the regional economy of close to $3 million in output, and over $1 million in wages was estimated.

The substantial effect of even a moderate fluctuation in pro-football activity indicates not only the beneficial impact that these franchises normally have on a given region, but also the regional economic vulnerability to these activities. While franchise owners receive the majority of their revenues from network television contracts, much of the rest of the regional economy is less able to ride out a strike. The $1,697,477 loss in value added to the Chicago regional economy, while small in percentage terms, indicates a certain vulnerability, since these monies have the most direct human impact in employee compensation. This human impact is accentuated by the fact that the most affected sectors are among the more labor intensive activities in the economy (services, wholesaling, and retailing, for example). Hence, although these professional sports franchises can have very real benefits to a regional economy, they also can have very real human costs when interrupted or lost. This is especially relevant in light of the all too frequent departure of franchises from given localities, even after substantial public-sector investments to lure or keep the activities within their borders.

Harvey J. Miller and Randall W. Jackson, are Ph.D. candidate and assistant professor, respectively, of the Department of Geography at The Ohio State University. Information on the sources used in this article are available from the authors upon request.

Illinois Economic Update

The contents of the Bureau of Economic and Business Research's annual publication, the *Illinois Economic Outlook* are completed a few months before the booklet emerges from the printing process. Partly as a consequence of publication lag, but chiefly as a consequence of delays in data availability, it is frequently the case that the analyses underlying the *Outlook* are based on information remote in time for the year for which predictions are relevant. Moreover, from time-to-time there are important, but unanticipated, changes in the external environment. Such changes often make prior forecasts obsolete.

In an effort to keep our readers abreast of important changes, the *Illinois Business Review* presents this brief update of 1988 *Illinois Economic Outlook*.

State Taxes and Expenditures by J. Fred Giertz

State tax revenues have been slightly stronger than expected, yet they are insufficient to meet the many expenditure demands of the state. Indicative of the state's cash flow problems, tax refunds and various other state payments have been extremely slow (most notably Medicaid reimbursements to health care providers).

Prospects for the remainder of the year hinge on the passage of a tax increase. Without an increase, state fiscal conditions are likely to become even more austere.

Elementary and Secondary Education by James Gordon Ward

The governor's budget provided no funding increase for elementary and secondary education. This carries adverse long-term implications for the state's economic development.

Investment in Infrastructure by J. Fred Giertz

Even though the road fund balance continues to be substantial, the governor has proposed a 5-cents-per-gallon gasoline tax to be used for maintenance and new construction.

The highway congestion problem in suburban Chicago, especially DuPage County, has become an important issue of concern.

Exchange Rates by Morgan J. Lynge, Jr.

Following a peak in early 1985, the US dollar has fallen against most foreign currencies. Having approached its 1980 level by the end of 1987, the decline in the value of the dollar has slowed. Hence, the benefits flowing from the devaluation—declining relative prices of Illinois' agricultural products and Caterpillar tractors—have stopped increasing. If the price of the dollar remains stable, any further gains in foreign demand for Illinois products must reflect other factors.

Agriculture by Darrel Good

Farm income growth is more favorable than anticipated in the 1988 *Outlook*. The improved income picture reflects higher prices and improved demand for soybeans along with strengthened livestock prices.

Export demand for soybeans and soybean oil has been stronger than anticipated. The increased demand has emerged from unanticipated Soviet purchases of soybeans, ongoing weather problems in India (which have reduced oilseed production), and late season dry weather in Brazil (which has reduced the size of the 1988 soybean harvest). Increased exports have resulted in a more rapid reduction in the US soybean surplus than expected. As a consequence, average prices over the next 18 months will probably be at the highest levels in four years.

Because of a low rate of expansion in US pork production, livestock prices are likely to continue to be higher than previously anticipated

Employment by Gregory A. Gilbert

Since the publication of the 1988 *Outlook*, employment growth statistics for 1987 have been released. Illinois employment rose 1.4 percent last year, compared with an increase of 2.6 percent in the nation as a whole. Even so, the state unemployment rate declined to 7.4 percent, a 0.75 percent decline. The US unemployment rate drifted to 6.2 percent in 1987, only 0.12 percent lower than during the preceding year.

Commercial Banking by Morgan J. Lynge, Jr.

Illinois remains an attractive market for out-of- state bank holding companies, and the acquisition of Illinois banks continues. Most of the acquired banks are located in the suburbs of Chicago. Such acquisitions provide out-of-state banks with important footholds in lucrative consumer and middle-sized business markets.

Illinois' two largest banks, along with most large US banks, reported huge losses for 1987 as they wrote down the value of their loans to borrowers in less developed countries. Both Illinois banks appear to be posed for improved profitability in 1988.

Chicago Financial Markets by Joseph E. Finnerty

The October 1987 stock market crash raised important questions relating to the role of the financial futures and options markets. The chief question in the continuing debate is whether these markets contributed to the severity of the decline. If, at length, the trading and use of futures and options is restricted by regulation, the Chicago markets will receive a damaging blow, for such regulation may drive the markets offshore beyond government control.

Outlook by Marvin Frankel

In the 1988 *Outlook* we took note of the October 1987 precipitate stock market slide, with its potential for adverse economic impact. Our concern was that the substantial decline in a major category of financial assets could cause restraint in consumer and business spending, leading in turn to below-forecast performances in both the nation and the state. In the months following the slide, most business economists cut their forecasts for growth in 1988 significantly, and some anticipated a recession as early as the second quarter of this year.

Fortunately the logic of forecasts is not always, if often, the logic of the economy. As events have had it, both the national and state economies have held up quite well, with output, employment, consumption, and investment all continuing to expand. Economists have been revising their forecasts toward their original levels. The predominant current concern for the near term is for tightening product markets and accelerated price increases. An examination of the economic record for the past six months does not reveal even a hint of the major disturbance in financial markets that took place in 1987.

As of this writing, the outlook for the Illinois economy remains reasonably satisfactory. For 1988, as compared with 1987, the Illinois econometric model indicates that employment will be up 2 percent, nominal personal income 6.4 percent, and manufacturing value added 4.5 percent. Income generation in both retail trade and in services should also rise by 7 percent and 9 percent, respectively. However, much of the gain in these categories will be realized in the first half of the year. Thus, it is expected that employment will be flat in the July-December period and that manufacturing value added will rise only about 1 percent.

RICHARD KOLHAUSER

The Growth in State Taxes: A Review of the 1971–1987 Period

One of the most important characteristics of a state's tax structure relates to how much new revenue is generated each year. One way state tax revenue can increase is as a consequence of legislative action. For example, revenues will rise if the legislature increases tax rates or approves a new tax. But tax revenues also increase routinely without legislative action. In this latter case, the increase in revenue is generally referred to as the "natural growth" or "automatic increase."

Natural growth occurs because state tax revenues tend to expand along with growth in the economy. In Illinois, from 1971 to 1987, state tax receipts deposited into the state's general funds increased from $2.6 billion to $8.6 billion, with most of the $6 billion increase resulting from natural growth.

In general, the broader the tax base the more revenues tend to reflect general economic growth. Accordingly, broadly based taxes generally constitute a reliable source of revenue growth. For example, the Illinois income and sales taxes are broadly based, tending to grow along with the state economy. In contrast, the cigarette and liquor taxes do not conform closely to shifts in the Illinois economy.

The natural growth in revenues plays a vital role in public finance. It has been common to expect that the natural growth in state revenues will finance routine increases in the cost of state programs due to such causes as inflation and the growth in service levels (caseloads). If the tax structure is quite responsive to economic growth, the natural growth in revenues might also be enough to finance limited expansions in state programs. However, the legislature must generally enact a tax increase to finance a major new program or to expand existing programs significantly.

There is no optimum rate at which taxes should increase, but problems develop if revenue growth is out of balance with economic growth. If taxes grow faster than the state economy, the state tax burden begins to climb, taxpayers may start to complain, and businesses may threaten to relocate. On the other hand, if the rate of natural increase in revenues lags behind the rate of economic growth, the level and quality of state services may decline, programs may be cut, and/or frequent tax increases may be needed. For these reasons, a stable system of public finance is generally thought to depend upon a tax structure that yields increases in revenues at roughly the same rate as the growth in the state economy.

The purpose of this article is to review the growth in state tax revenues from fiscal year 1971, the first full year of the state income tax, to 1987, the last completed fiscal year. State fiscal years begin in July and end the following June. For example, state fiscal year 1988 began July 1987 and finishes June 1988 (unless otherwise noted, dates refer to state fiscal years). The analysis relates the growth in state revenues to the growth in the Illinois economy. It identifies and describes some of the economic, demographic, and legislative influences that helped determine revenue performance in the 1970s and the 1980s.

General Fund Revenues and Tax Sources

The analysis centers upon the state's general revenue funds (GRF). Revenue growth from the fund is of interest because the state's two largest tax sources, the income and sales taxes, are deposited chiefly into it. Furthermore, the general revenue fund supports many of the largest and most prominent state programs, including elementary and secondary education, higher education, community colleges, the state prison system, care for neglected children, help for the elderly, care for the mentally ill, and enforcement of public health standards.

In 1987, total GRF revenues were just over $11 billion. Of this amount, state taxes yielded about $8.6 billion, 78 percent of the total revenues. Other GRF receipts consisted of federal reimbursements for public aid spending, $1.6 billion (13 percent); the lottery, $553 million (5 percent); and miscellaneous sources, $300 million (3 percent).

The $8.6 billion yield from GRF taxes was derived from the sources shown in Table 1. The income tax, sales tax, and public utility taxes produced about 91 percent. Over the years, most of the natural increases in GRF taxes have derived from these three sources. Other taxes contribute only marginally to the annual increase in revenues. For most of the 1980s, however, the state lottery has significantly enhanced the growth in GRF receipts. For this reason, the analysis of GRF revenue growth frequently includes the lottery even though it is not really a state tax.

Table 1. General Funds Tax Sources—FY87 *($ billions)*

	Yield	*Percent of Total*	*Cumulative Percent*
Income Tax	$4.0	47	47
Sales Tax	3.2	37	84
Public Utility Tax	0.6	7	91
Cigarette Tax	0.2	2	92
Liquor Tax	0.1	1	93
All Other	0.6	6	100
Total Taxes	$8.6		

Tax Growth 1971–1987

In the last 16 years, the yield of GRF taxes increased $6 billion, from $2.6 billion in 1971 to $8.6 billion in 1987. During this period, there were only a few legislatively approved tax increases. It can be argued that one significant exception is the increase in the state sales tax rate from 4 percent to 5 percent in 1984. This action generated substantial new GRF revenues. Even so, the revenues gained from this rate increase served to offset revenues lost to preceding tax relief. In fact, considering the 1971–1987 period as a whole, the cumulative revenues lost through tax relief are not materially different from the new revenues generated through legislatively approved tax increases.

The state income tax rate was also increased in 1984, but the rate increase was temporary. An initial gain in revenues prompted by the higher rate was offset after the rate expired. Therefore, cumulative revenue growth over the 1971–1987 period was not affected. Other tax increases enacted during the period were of comparatively minor magnitudes and did not significantly affect revenue growth. For these reasons, the $6 billion increase in the GRF tax yield from 1971–1987 can be viewed as resulting primarily from "natural growth."

In percentage terms, the increase in GRF annual tax revenues from 1971 to 1987 was 230 percent without the lottery and 252 percent with the lottery included. Over this period, the average annual rate of increase for GRF revenues was 7.8 percent (8.2 percent including the lottery).

How do these increases compare to the growth in the Illinois economy for the same period? The change in the annual flow of Illinois personal income is a useful and common method to measure growth in the state's economy. The growth in Illinois personal income is shown in Table 2.

Table 2. The Growth in General Fund Revenues

	Percent Change from 1971–1987	*Average Annual Percent Change*
Taxes	230	7.8
Taxes and Lottery	252	8.2
Inflation (CPI)	180	6.6
Illinois Personal Income	252	8.2

There is a view that if the natural growth in state revenues does not match the rate of inflation, the state's ability to provide services will decline. For this reason, the growth in inflation is also shown in Table 2.

Since the first full year of the state income tax in 1971, the average rate of increase in GRF revenues plus the lottery has exceeded the rate of inflation and been equal to the growth in Illinois personal income. This is a very important result. It is a principle reason why Illinois has been able to maintain a reasonably stable tax structure since 1971.

For the period as a whole, the increase in GRF revenues was sufficient to finance the inflation-induced increases in state spending, provide for modest expansion in existing programs, and even to allow for the addition of a few new programs.

Revenue Growth: Two Decades Compared

It is important, however, not to read more into the 1971–1987 experience than it contains. Discussion of the period as a whole is somewhat misleading. There are, in fact, two important different trends within the overall period. One trend dominated the 1970s; the other has characterized the 1980s.

From 1971–1979 GRF revenues grew more rapidly than both inflation and Illinois personal income (Table 3). Revenues grew at an average rate of 10.3 percent per annum. By comparison, the rate of inflation averaged only 7 percent, and Illinois personal income 9.7 percent. As a result, for each 1 percent increase in inflation and personal income, GRF revenues increased 1.47 percent and 1.06 percent, respectively.

For the 1980s, the average increases in GRF revenues has been only about one-half the rate for the 1970s (5.3 percent versus 10.3 percent). The slower rate of increase can be partially attributed to a reduced rate of inflation. But the growth in GRF revenues was even slower than the growth in inflation and state personal income.[1]

From 1979 to 1987 GRF revenues increased an average of 5.3 percent per year compared to an inflation rate of 6.3 percent and a 6.7 percent growth rate in Illinois personal income. In the 1980s, for each 1 percent increase in state income, the increase in GRF revenues has been only 0.79 percent. If personal income were to increase by 5.5 percent, revenue growth would be about $125 million less each year than would have been the case with the preceding decade's 1.06 percent factor.

For most of the 1980s revenues from the state lottery have helped to supplement the growth in GRF revenues. The lottery grew at an especially rapid pace from 1980–1986, with increases averaging nearly 61 percent ($87 million) a year. Even though the lottery was and remains but a small proportion of total GRF revenues (about 5 percent), it was a major source of new revenues during this period. In 1983, the trough of the recession, the lottery increased more than all other GRF taxes combined.

If growth in the lottery is combined with the growth in taxes, the overall increase in GRF revenues averages 6 percent a year. Such an increase is stronger than the 5.3 percent average rate of growth for taxes alone, but falls short of the 6.3 percent inflation rate and the 6.7 percent growth in state income (Table 3).

Table 3. The Growth in General Fund Revenues: Comparison of 1970s and 1980s *(% increase)*

	1971–1979 Average Annual Percent	*1979–1987 Average Annual Percent*
Taxes	10.3	5.3
Taxes and Lottery	10.4	6.0
Inflation	7.0	6.3
Illinois Personal Income	9.7	6.7

The reason GRF taxes grew at a slower rate than the state economy is simple in terms of arithmetic. Each of the three largest GRF revenue sources grew more slowly than state personal income. Just the opposite was true in the 1970s, when the average rate of growth for the public utility, sales, and income taxes, surpassed the growth in personal income (Table 4).

Table 4. The Growth in General Fund Revenue Sources: Two Periods Compared

	1971–1979 Average Annual Percent	*1979–1987 Average Annual Percent*
Public Utility	13.9	3.7
Income Taxes	11.4	6.5
Sales Tax	10.1	5.1
Inflation	7.0	6.3
Illinois Personal Income	9.7	6.7

The sharpest slowdown occurred in the public utility tax. After increasing almost 14 percent per year in the 1970s, the public utility tax has increased on average only 3.7 percent a year in the 1980s, far less than the 6.7 percent average annual rate of growth in personal income.

There are several reasons why nominal and relative growth in revenue from the public utility tax have declined. Following the first oil boycott in the mid 1970s, energy prices increased at extraordinary rates through 1981. In 1980, for example, energy prices jumped 38 percent! In response, the public utility tax collections increased, on average, over 14 percent a year from 1975 to 1981.

But the public utility tax has not contributed to GRF revenue growth since 1984. In fact, revenues from this source have declined in three of the last four years. This decline is due to at least four factors. First, the rapid growth in energy prices began to level off in 1983; by 1986 energy prices were actually declining. Secondly, following adoption of energy conservation measures by business and individuals, the consumption of natural gas has been on the wane. Natural gas sales are one of the principle components of the public utility tax. Third, the jump in energy prices has encouraged users to contract directly with pipeline companies for natural gas, thus bypassing the local utility and the state public utility tax. Fourth, the public utility tax was changed by the legislature so that increases in energy prices do not increase the yield—the tax has been "capped." One of the three largest GRF tax sources and a principal source of revenue growth over the last two decades no longer keeps up with the economy.

Growth in the state sales tax has also fallen behind the growth in personal income. In the 1970s, for every 1 percent increase in personal income, the sales tax increased 1.04 percent; the equivalent ratio for the 1979–1987 period is only 0.76 percent. The decline in this ratio means that, on average, the annual growth in the sales tax has been reduced by about $50 million.

Like the utility tax, the sales tax also responded to the increase in energy prices in the 1970s. Gasoline constitutes about 8 percent of the total sales tax base. As gasoline prices soared in response to the oil boycott, the sales tax yield was pushed higher. The price of food, an even larger component of the sales tax base, rose almost as dramatically as energy costs at times during the 1970s. For example, the price index for food jumped nearly 18 percent in 1974. From 1971 to 1979, both food and energy prices increased faster than inflation generally, helping to push the average rate of sales tax increase ahead of the increase in personal income.

Since 1980, however, the sales tax has not kept pace with the Illinois economy. Several tax relief measures for business and individuals were enacted from 1979 through 1987.[2] The most significant of these were enacted early in the decade. The first important measure was an exemption for business equipment and machinery. This exemption was quickly followed by a sales tax exemption for food and drugs. The exemptions were enacted just as the economy slipped into a long and severe recession. The revenue losses from tax relief, combined with the loss in sales from the recession, kept revenues from the sales tax from increasing from 1980 to 1983.

In 1984 the sales tax rate was increased from 4 percent to 5 percent, in part to help fill the void left by tax relief. Because of the way the rate change was structured, there were large increases in sales tax revenue in both 1984 and 1985. In 1986 and 1987, however, growth in the sales tax revenues again became quite sluggish, increasing just 3.7 percent and 0.6 percent, respectively. Part of the explanation for the diminution in revenue growth is that inflation diminished, averaging only about 2.5 percent. Additional sales tax exemptions also contributed to slow revenue growth. Beginning in 1986 a portion of the sales tax receipts were reallocated to the Build Illinois fund.

In the 1980s, revenues from the state income tax (corporate and individual) nearly kept pace with growth in the state economy, increasing annually at an average rate of 6.5 percent, just below the 6.7 percent growth in personal income. In the 1970s, income tax revenues increased faster than personal income (Table 4).

The individual income tax has been a consistent and reliable source of revenue growth, increasing at a somewhat faster rate than the Illinois economy in both the 1970s and 1980s. The corporate tax, after performing well in the 1970s, has not been a consistent source of revenue growth in the 1980s.

The individual income tax was a strong performer during the 1970s because the economy fell into recession just once, in 1975. Throughout the remainder of the decade, there was rapid growth in both employment and income, boosted by unusually favorable demographic trends. Employment gains in the 1970s were driven, in part, by the entry of the baby boom generation into the workforce. Women also began to participate in the labor force in unprecedented numbers.

These demographic trends have moderated in recent years. The baby-boom generation no longer fuels increases in the labor force. Also, growth in the labor force participation rate for women has slowed as the rate for women has approached the rate for men. Consequently, future increases in the individual income tax revenues will depend more heavily upon increases in wage levels and less upon the growth in employment.

Another factor contributing to growth in individual income tax revenues in the 1970s was the increase in the "effective income tax rate" for individuals.[3] But this factor will contribute only marginally to accelerated growth in the 1980s.

For the state as a whole, the effective income tax rate was less than 1.9 percent in the early 1970s but has increased over the years to about 2.2 percent. The effective tax rate has increased because the value of the personal exemption has remained fixed at $1,000 and because there has been a decline in nontaxable income from the sale of capital assets purchased before the income tax was enacted.

The effective rate for the individual income tax increased quite rapidly in the early years, enhancing the annual rate of increase. Now, however, the effective rate is increasing more slowly, and the fiscal bonus each year is small.

Revisions to federal tax laws have twice had a significant effect on individual income tax yields in the 1980s. Early in the decade, Illinois tax yields were reduced when changes in federal tax laws served also to reduce the state tax liability. However, the federal tax reform act of 1986 reversed many of the earlier changes, resulting in higher Illinois tax yields. A windfall gain from federal tax reform boosted the individual income tax yield in 1987 by about $100 million.

Both the individual and corporate Illinois income tax rates were increased in 1984. The increase was required to liquidate unpaid obligations carrying over from the recession years. The higher rate was effective for only one fiscal year, and state income tax rates dropped back to the original level (enacted in 1969).

A tax deduction enacted in 1984 continues, however. The individual income tax was used as a vehicle to provide property tax relief to Illinois homeowners. But since there are few such deductions (or other exemptions and credits), the individual income tax remains the GRF's most responsive tax source. It is the GRF source most likely to grow at the same rate as the Illinois economy.

The Illinois corporate income tax has not been a strong source of new revenues in the 1980s, with increases averaging less than 2 percent a year. In the previous decade, the corporate income tax outperformed the Illinois economy. In the early 1980s, there were few increases in corporate tax revenues because of the recession. For four years there was essentially no real growth in the national economy, and the recession jarred midwestern economies even more than the nation as a whole. Since 1980 state corporate income tax revenues declined each year until the tax rate was increased temporarily in 1984. Thereafter, corporate yields have been adjusted for so many events that it is not easy to determine how well the corporate income tax is performing. Some of these events included a change in the method of corporate reporting, certain one-time gains from audits and federal tax reform, and very high refund levels. At best, growth in the corporate tax has been inconsistent in the 1980s. The legislature has also recently revised the formula apportioning corporate income to Illinois, adding still more uncertainty as to how the corporate tax will grow in the future.

While the public utility, sales, and income taxes have been the most significant sources of GRF revenue growth since 1971, other tax changes have affected revenue growth from time to time. In recent years, for example, the state inheritance tax has been eliminated, a messages tax has been enacted, and the cigarette tax rate has been increased. Such changes affect revenue growth at the time of enactment, but do not critically affect revenue growth over the long term.

Will GRF Revenue Growth Match Economic Growth in Coming Years?

This analysis has shown that the rate of GRF revenue growth has fallen behind the rate of growth in the Illinois economy in the 1980s. Estimates of the increase in state taxes for 1988 and 1989 continue below the projected rate of increase in Illinois personal income. Because tax revenues are lagging behind the Illinois economy, GRF revenue growth is reduced by about $125 million per year.

There is no solid evidence to indicate how the gap in growth rates will change in the coming years, but it seems unlikely that the current tax structure can generate natural revenue growth at a rate equaling the growth in the Illinois economy. This issue is of particular importance because future increases in the state lottery are not likely to be quite so robust as in years past, placing the burden of maintaining state services solely upon the growth in GRF revenues.

The future performance of the three largest GRF revenue sources will largely determine whether the rate gap can be narrowed. The outlook for the public utility tax as a future source of revenue growth, is not especially good. This source, once the strongest GRF revenue performer, appears effectively constrained by legislation limiting future increases. The Illinois corporate tax is an unreliable source of revenue growth for the future, due to legislative changes and changes in federal tax laws. There is, however, at least one reason to be optimistic. The outlook for US and Illinois exports has improved in recent months. A higher level of Illinois exports, which results in higher corporate profits, could help revitalize the Illinois corporate income tax. It is also possible that federal tax reform could benefit Illinois more than is currently expected.

The individual income tax is the most reliable GRF revenue source. In the 1980s the tax revenues increased at a pace faster than the Illinois economy. There have been few reductions to the tax base, and there is every reason to believe that the individual income tax will continue to be a principle source of GRF revenue growth.

If in coming years the gap between the growth in GRF taxes and the growth in the Illinois economy is to narrow, it will probably be because the sales tax is more "responsive to the economy" than it now appears. The sales tax base without food, drugs, and business equipment is still comparatively new. Even so, the first evidence suggests that the new base is not as responsive to economic growth as it once was. If the performance of the sales tax does not show marked improvement, the gap in growth rates between GRF revenues and the Illinois economy is not likely to decline.

NOTES

[1] Transfer payments, a nontaxable component of personal income, has increased faster than personal income as a whole. However, even with the exclusion of transfer payments from personal income, the comparisons in Tables 3 and 4 remain valid.

[2] The sales tax exemptions included sales of business equipment and machinery, food and drugs, farm equipment, gasohol, graphic arts equipment, oil field equipment, coal and mining equipment, and certain materials used in enterprise zones.

[3] The effective rate is defined as tax collections/adjusted gross income. The effective tax rate is always less than the statutory tax rate of 2.5 percent. For an individual taxpayer, the effective tax rate varies with income and the number of personal exemptions claimed.

Richard Kolhauser is the deputy director of the Bureau of the Budget, State of Illinois.

Gregory A. Gilbert

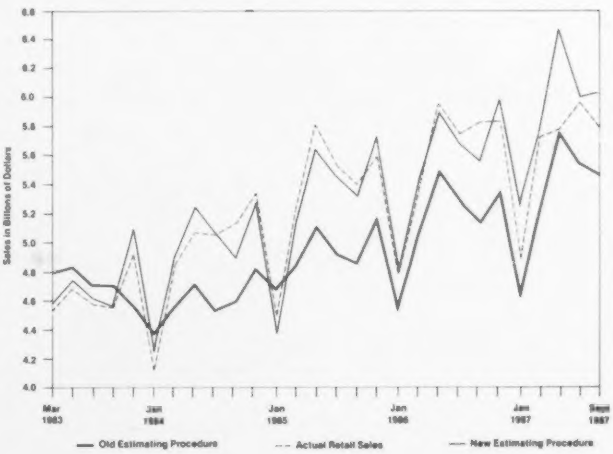
Forecasting Model Updated

In a continuing effort to make available the most accurate forecasts, the Bureau of Economic and Business Research has updated the Illinois retail forecasting model. Since July 1981, BEBR has published the most recent month forecast estimate in the Business Index section of the *Illinois Business Review*. The historical Illinois retail sales series is furnished by the United States Commerce Department and is updated in each issue of the *Review*.

Advances in econometrics and statistical analysis have allowed for the development of improved forecasting procedures. Both the current and old procedures base forecasts on past trends. Forecasts based on historical data do not take into account current changes in the economy. Even so, they provide bench marks for the near-term future, assuming changes in the economy affect retail sales gradually rather than in sudden shifts.

As the chart illustrates, the estimates from the updated procedure are markedly more accurate than the old procedure. For the illustrated sample period, the new estimates are in error by an average of 1.08 percent, with a standard deviation of 3.32 percent. The old estimates had a average error of −5.12 percent, with a standard deviation of 5.4 percent. The new estimating method continues to show relatively large errors. For example, in May 1987, the model overestimated retail sales by 12 percent. But the frequency of these relatively large errors has been reduced. There were four errors greater than 10 percent with retail sales estimated by the old method. There was only one error term of this magnitude with the new method.

Bimonthly Retail Sales Forecast



Illinois Business Indexes

The economic outlook for Illinois continues to improve. As Chart 1 illustrates, the current indicator has exceeded the trend indicator for the last four months. This movement indicates a continuation of the economic expansion.

The February and March levels of nonagricultural employment reached all time month highs. Seasonally adjusted nonagricultural employment increased steadily during the first quarter of 1988 (Chart 2). The March level of nonagricultural employment was by 2.0 percent (or 95,000 jobs) higher than a year earlier. Manufacturing employment has risen 1.5 percent reflecting an increase in 10 of the last 12 months (Chart 3). Durable employment has increased slightly more than seasonally since August of 1986 (Chart 4).

The state's unemployment rate continues to exceed the national average (Chart 5). In March, the national average dipped to its lowest level for this decade (5.6 percent). Although the Illinois rate dropped to 7.3 percent, the Illinois unemployment rate remains higher than its September 1987 low of 6.4 percent. Unemployment had increased sharply in February (from 6.7 percent to 7.5 percent). The Illinois Department of Employment Security attributes much of the February increase to the weather. February was colder than normal, resulting in layoffs in the construction, transportation, and mining industries. In addition, there were employment losses in retail trade.

Inflation in Chicago has drifted lower since August 1987. Even so, rates of price level increase over the past year are markedly greater than during the preceding year (Chart 6).

ILLINOIS BUSINESS INDEXES

	Percent Change March 1987– March 1988	*March 1988*	*Feb 1988*	*Jan 1988*	*Dec 1987*	*March 1987*	*Feb 1987*
Leading Indicator (Current Indicator)	–0.31[a]	13.57	11.48	13.90	11.73	13.88	14.45
Leading Indicator (Trend Indicator)	0.51[a]	12.99	12.24	11.67	10.83	12.48	12.46
Employment-manufacturing (in thousands)[b]	1.49%	939.7	938.0	938.1	936.8	925.9	926.5
Average weekly hours-manufacturing[b]	0.96%	41.9	41.9	42.0	42.4	41.5	41.5
Weekly earnings-manufacturing[b]	3.10%	$465.09	463.41	$480.10	$481.60	$451.11	$448.62
Help wanted advertising-Chicago (1969 = 100)[c]	2.65%	116	116	116	108	113	113
Help wanted advertising-St. Louis (1969 = 100)[c]	– 1.47%	67	69	70	68	68	70
Retail sales (in millions)[d]	5.69%	$6,038	$5,264	$5,304	$7,504	$5,713	$4,952
Coal production (in thousands of tons)	1.07%	5,200	4,873	4,900	5,083	5,145	5,010
Petroleum products (in thousands of barrels)[b]	-3.85%	2,000	1,990	2,050	2,100	2,080	1,898
Vendor performance[e]	25.45%	69%	66%	68%	71%	55%	52%
Building permits (in thousands)							
Residential housing units	–23.07%	3.208	1.388	1.416	2.513	4.170	2.521
Value of residential housing	9.19%	$341,112	$161,368	$119,906	$205,704	$312,391	$192,823
Value of nonresidential construction							
Industrial buildings	–49.50%	$13,414	$17,734	$7,496	$27,143	$26,564	$6,136
Office, banks, and professional buildings	154.93%	$91,781	$124,263	$17,165	$26,725	$36,002	$41,551
Stores and other mercantile buildings	4.81%	$37,818	$28,496	$13,003	$26,366	$36,081	$25,312
Other	6.42%	$5,003	$1,565	$1,968	$2,059	$4,701	$6,037
Consumer price index (1982–84 = 100)							
North Central US	3.61%	114.3	113.7	113.4	113.3	110.3	109.7
North Central/population more than 1,200,000	3.73%	115.1	114.7	114.1	113.9	111.0	110.5
North Central/population 360,000 to 1,200,000	3.81%	114.2	113.5	113.3	113.0	110.0	109.6
North Central/population 50,000 to 360,000	4.09%	114.6	113.4	113.4	113.6	110.1	109.0
North Central/population less than 50,000	2.37%	111.1	110.5	110.6	110.9	108.5	107.8
Chicago	4.10%	116.9	116.6	115.3	115.7	112.3	111.9
St. Louis	3.16%	114.2	—	113.4	—	110.7	—
		1987:IV	1987:III	1987:II	1987:I	1986:IV	1986:III
Personal income (in millions)[b,f,g]	6.96%	$192,858	$189,809	$187,750	$187,233	$180,304	$179,096
Per capita personal income[b,f,g]	6.66%	$16,607	$16,357	$16,191	$16,157	$15,571	$15,477

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, March 1988. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Seasonally adjusted at annual rates. [g] Percent change between 1986:IV and 1987:IV.

Chart 1. Composite Leading Indicator
(average percent change in base indexes)

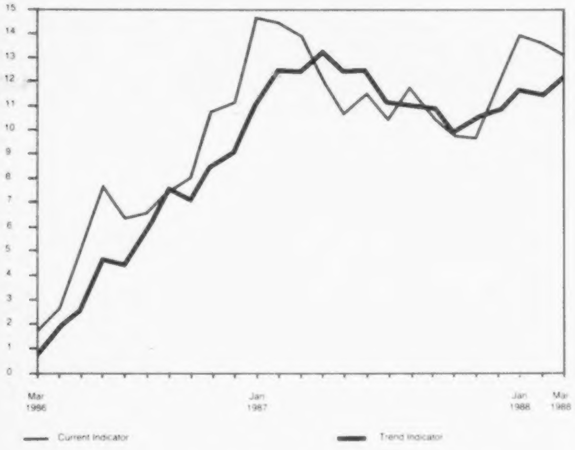


Chart 2. Nonagricultural Employment
(seasonally adjusted)

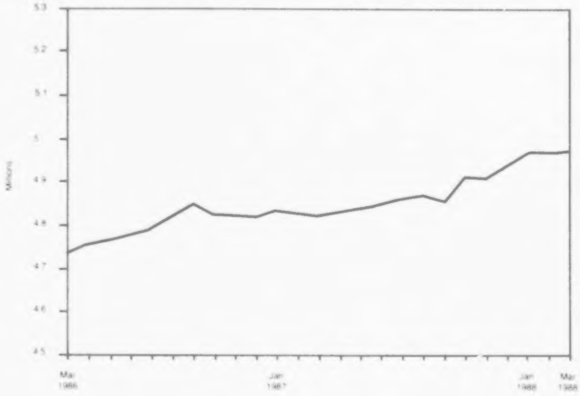


Chart 3. Manufacturing Employment
(seasonally adjusted)

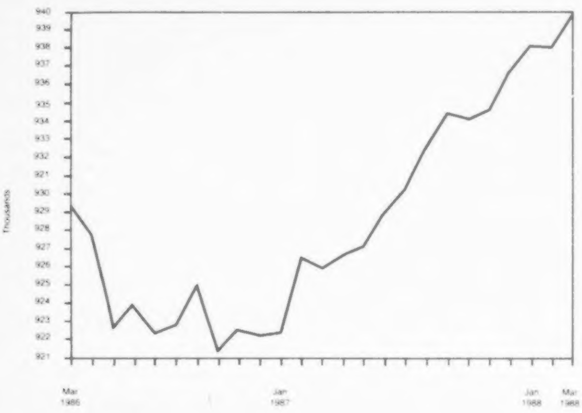


Chart 4. Durable Employment *(seasonally adjusted)*

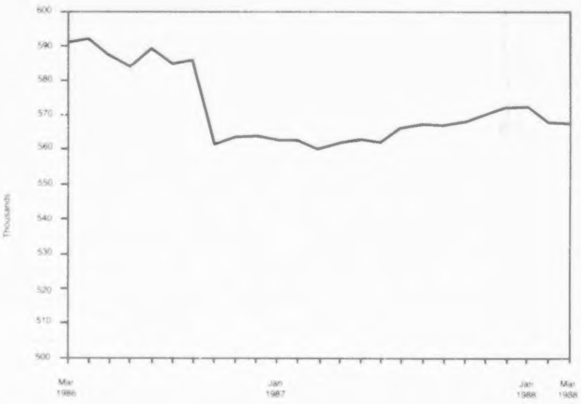


Chart 5. Unemployment Rates *(seasonally adjusted)*

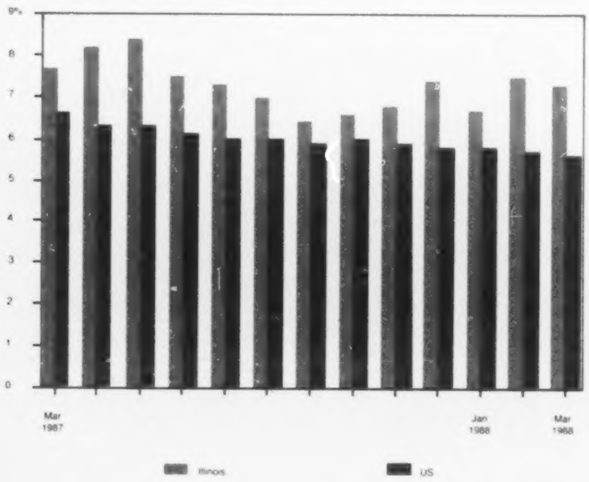
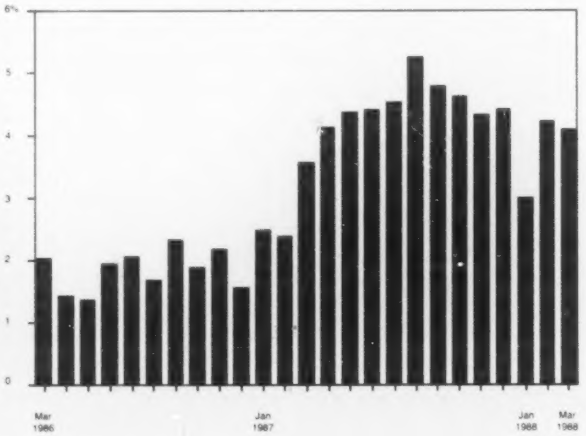


Chart 6. Year-to-Year Change in Chicago CPI



Second-class postage paid at Urbana, Illinois.

Illinois Business Review

Bureau of Economic and Business Research
428 Commerce West, 1206 South Sixth Street
Champaign, Illinois 61820

CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

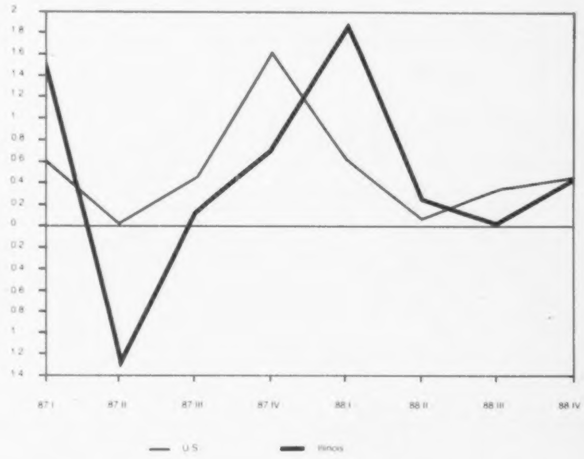
Illinois Economic Outlook

The Illinois Econometric Model predicts a 5 percent growth in personal income during 1988. During 1987, nominal personal income increased by 4.8 percent. After adjusting for anticipated increases in the price level, a 5 percent expansion in nominal income translates into growth in real income of about 1.2 percent.

Most of the growth in state income results from growth in public utilities and transportation, services, and construction. The table summarizes the past and predicted behavior of nominal personal income in Illinois for each major sector.

Real personal income for the nation as a whole rose by 2.3 percent in 1987 and is expected to increase by about the same percentage in 1988. The chart indicates the relationship between changes in real income in the US and in Illinois. Changes in personal income in Illinois appear to follow those in US income. However, income fluctuations are more pronounced at the state level.

Real Personal Income Growth *(percentage change from previous quarter)*



Illinois Seasonally Adjusted Personal Income

	History				*Forecast*			
	87:I	*87:II*	*87:III*	*87:IV*	*88:I*	*88:II*	*88:III*	*88:IV*
Total personal income (millions)	$187,815	$187,750	$189,809	$192,858	$197,982	$200,313	$202,351	$205,285
Private nonfarm	118,135	118,520	120,223	122,359	125,658	127,068	128,201	129,834
Mining	1,327	1,418	1,451	1,469	1,513	1,486	1,462	1,445
Construction	8,578	8,393	8,479	8,821	9,295	9,194	9,087	9,042
Manufacturing	29,262	28,777	29,038	29,504	30,308	30,478	30,663	30,846
Durable manufacturing	18,018	17,601	17,966	18,228	18,685	18,709	18,777	18,849
Nondurable manufacturing	11,244	11,176	11,072	11,276	11,623	11,786	11,885	11,996
Transportation and utilities	10,337	10,840	10,938	11,318	11,798	11,752	11,677	11,676
Wholesale and retail trade	23,398	23,690	24,088	24,321	24,698	25,080	25,470	25,873
Finance, insurance and real estate	12,773	12,531	12,820	12,973	13,223	13,479	13,639	13,927
Services	31,997	32,407	32,953	33,953	34,823	35,598	36,203	37,025

Bureau of Economic and Business Research

U6910-1
8/24/88

August 1988
Volume 45, Number 4

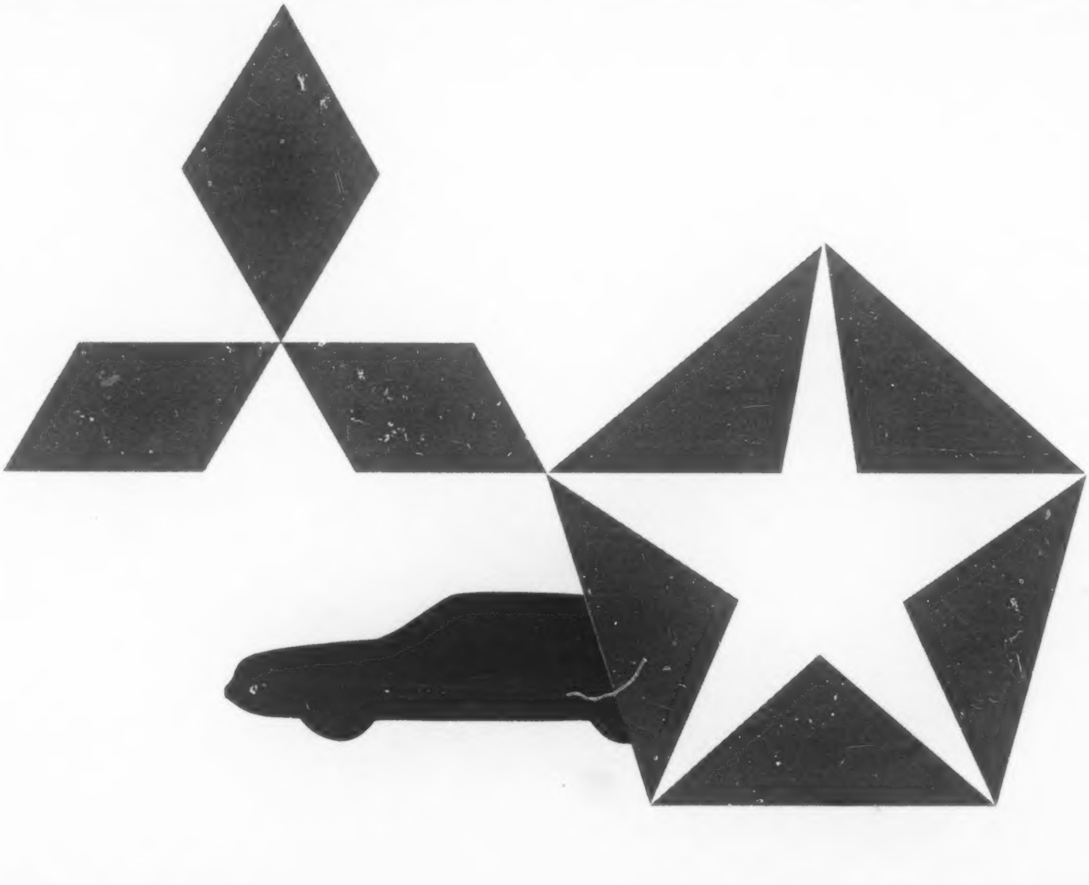
Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

Economic Impact of Diamond-Star / 2

Real Estate Sales / 6

Mutual Fund Size and Risk Adjusted Performance / 11



August 1988 Illinois Business Review Volume 45 Number 4

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Director, Robert W. Resek; *Acting Director*, Marvin Frankel; *Editor*, William R. Bryan; *Technical Editor*, Janet R. Fitch; *Designers*, Ronald Sterkel and Kimberly Nyberg; *Research Assistants*, Paul C. Bishop, Edgardo Buscaglia, Martin Dwyer, Mary A. Laschober, and Anne E. Winkler; *Director of the Office of Real Estate Research*, James R. Follain.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide current information on business conditions.

Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.

The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois.

Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

HARRISON S. CAMPBELL, JR.

State and Regional Economic Impact Of Diamond-Star Motors

On 7 October 1985 the Chrysler Corporation and Mitsubishi Motors Corporation of Japan announced a joint venture to assemble automobiles in Bloomington, Illinois. The Diamond-Star Motors Corporation was thus established to produce 240,000 subcompact cars per year beginning in September 1988. Construction of the two million square foot plant began in April 1986 on 636 acres in western Bloomington and was completed in March 1988.

The announcement of Diamond-Star's decision to locate in Illinois came after the Illinois Department of Commerce and Community Affairs extended $88.2 million of incentives in the form of training ($40 million), site acquisition ($11 million), highway improvements ($25.8 million), and water and sewer improvements ($11 million). Such incentive programs have become more commonplace in the United States; the *Chicago Tribune* has coined the phrase "Japan's auto alley" to describe the recent emergence of Japanese auto manufacturing stretching from Ontario, Canada, to Smyrna, Tennessee.

While an auto assembly plant provides a textbook example of the possible impact that a major employer can have on a state or local economy, no comprehensive study of the potential economic effects of Diamond-Star has been published. This article provides an analysis of the impact in three stages. First, the construction phase of Diamond-Star will be analyzed at the regional level, followed by an examination of the statewide effects of Diamond-Star's operations phase. Finally, a multiregional analysis is conducted to demonstrate the spatial distribution of economic impact.

Method of Assessment

The method used for this economic assessment was the Conjoined Input-Output and Econometric Forecast Model developed at Regional Economic Models, Inc. (REMI). This model has been used in several states to provide forecasts of economic activity. While there are certain weaknesses associated with both input-output and econometric techniques, their conjoined use helps to overcome some of the inherent deficiencies of each. For example, the national input-output table (which simultaneously describes the interaction of industries, governments, and households at the national level) is adjusted to reflect the industrial structure of Illinois through the application of industry-specific regional purchase coefficients. After the initial impact is estimated by the input-output model, each year's forecast is simulated through supply and demand values generated by the econometric model.

An attractive feature of the REMI model is its reliance on established theory. Unlike some econometric models, the embedded structural relationships reflect specific economic theory rather than purely statistical relationships or mere data availability. The methodology is internally consistent with neoclassical behavior and production theory. Therefore, firms are assumed to compete for scarce resources, and labor is assumed to move between industries and regions according to wage conditions.

Flexibility is built into the model in two ways. First, over 800 "policy" variables can be altered by the user. When appropriate information exists, industry-specific variables such as corporate tax rates, employment, export costs, unemployment compensation, and so on can be adjusted to coincide with prior information or the analyst's judgment. Second, the model allows the exogenous shock to be time-phased according to an expected production schedule. These factors suggest that the REMI model is well suited for studies of economic impact. However, REMI is a "black box" model; that is, it is an interactive computer model with its equations embedded in the program. While results of any simulation are dependent on parameters that reflect economic relationships, many of these parameters are inaccessible to the user. For example, recall that regional purchase coefficients are applied to "regionalize" the national input-output model. REMI estimated the regional purchase coefficients for the Passenger Motor Vehicles sector as .03, meaning that 3 percent of the inputs necessary to assemble a car are available in Illinois. Users do not have access to these values, however, and thus cannot change them to reflect changes in the state's ability to supply Illinois firms. This is unfortunate since many secondary effects are shown to occur in supplying industries.

Using the REMI model

When using any input-output model to conduct an impact study, the exogenous economic shock is modeled as a change in final demand for the output of the industrial sector of interest. Most input-output models are constructed using monetary values of input and output for the industries in the region, but employment or income values can be used similarly. For this study, employment data for the passenger motor vehicles sector were used to "drive" the model. While employment estimates for the operation phase were regularly published, similar data were needed for the construction phase if it was to be modeled separately. These data were estimated using the Illinois average construction expenditure split between labor and material expenditures (34 percent for labor, 66 percent for materials) to the total value of construction. The site estimator at Diamond-Star reported that construction laborers received approximately $15 per hour. This figure was then used with total labor costs to yield an estimate of total construction employees.

The operations of Diamond-Star are reported to begin at half capacity in 1988 and move to full capacity in 1989. Table 1 presents these employment figures as they were entered into the model. It was assumed that the transitional nature of the construction phase would not induce a migratory response. Accordingly, the wage response variable that reflects changes in the labor supply due to migration was "turned off." Thus, the supply/demand relationships do not change, and extraregional labor will not respond. During the operations phase, however, this variable was not altered, and wages and labor will respond according to their relative supply and demand in each industry.

Table 1. Driving the Model

	Employment in Persons	
	Construction	*Operations*
1986	483	–
1987	483	–
1988	–	1,450
1989	–	2,900
1990	–	2,900
1991	–	2,900
1992	–	.
1993	–	.
1994	–	.
1995	–	2,900

Results from the REMI model

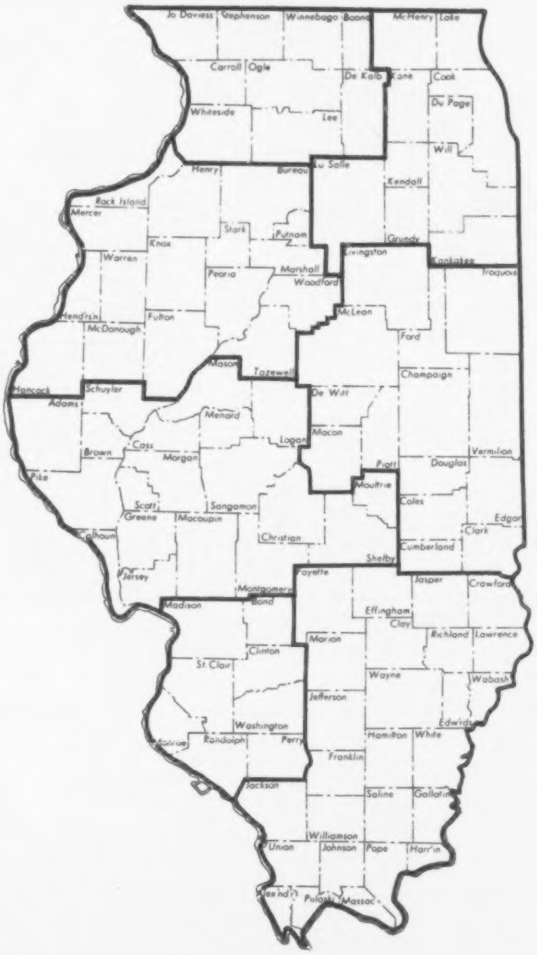
As noted above, the analysis of Diamond-Star and the construction project are presented at the regional, state, and multiregional levels. The Department of Commerce and Community Affairs has divided Illinois into seven regions based on commuting patterns. These regions are used for the regional analyses and are presented in the map.

Construction Phase

The analysis of the construction phase is restricted to Region 5 (see map) because most of the labor employed was assumed to be local. Labor from outside the region was used only in cases where the particular skill was not available locally. A conversation with the estimator at the Diamond-Star construction site revealed that this amounted to less than 5 percent of the construction labor employed.

Diamond-Star began plant construction in 1986, when 483 persons are estimated to be employed directly in construction while 149 are expected to be employed indirectly in supplying (intermediate) sectors and through induced consumer spending for a total of 632 (in this analysis, the present tense is used to describe the results obtained from modelling). By 1987, intermediate employment should increase slightly while the effects of local spending will bring total employment to 725. By 1988, the construction phase was finished. Accordingly, construction-induced spending and employment falls dramatically in 1988 to 110, with only 10 employed in intermediate sectors for a total of 120. By 1989, only residual construction employment will remain, and by 1991 employment impact for Region 5 will have been exhausted.

Illinois's Seven Commuting Regions


Jo Daviess
Stephenson
Winnebago
Boone
McHenry
Lake
Carroll
Ogle
De Kalb
Kane
Cook
Du Page
Whiteside
Lee
Will
Henry
Bureau
La Salle
Kendall
Rock Island
Mercer
Stark
Putnam
Grundy
Knox
Warren
Livingston
Kankakee
Iroquois
Peoria
Marshall
Woodford
Henderson
McDonough
Fulton
McLean
Ford
Mason
Tazewell
Champaign
Hancock
Schuyler
Adams
De Witt
Menard
Macon
Logan
Brown
Cass
Morgan
Vermilion
Douglas
Piatt
Pike
Moultrie
Scott
Sangamon
Coles
Greene
Macoupin
Edgar
Clark
Calhoun
Christian
Cumberland
Shelby
Jersey
Fayette
Jasper
Crawford
Montgomery
Madison
Bond
Effingham
Clay
Richland
Lawrence
Marion
Clinton
St. Clair
Wayne
Wabash
Jefferson
Edwards
Washington
Monroe
Randolph
Perry
Hamilton
White
Franklin
Jackson
Saline
Gallatin
Williamson
Union
Johnson
Pope
Hardin
Alexander
Pulaski
Massac

Department of Geography, University of Illinois

Wage and salary disbursements during the period are approximately $16.5 million in 1986 and $17.3 million in 1987, and fall to $3.3 million in 1988. As expected, this impact occurs primarily in the same sectors as employment (construction, durables, retail). By 1989 there is virtually no income impact visible, and the consumer price index is estimated to fall from a peak change in 1988 of .015 percent to less than .010 percent from 1990 to 1995.

In general, the bulk of the construction-related impact is contained within 1986–1988. This is to be expected in light of the date of operations at Diamond-Star. The transitional nature of construction projects implies that we should not expect employment induced by the construction project alone to be permanent.

Statewide Operations

An examination of employment effects by major sector reveals that the larger exogenous shock has a broader sectoral impact (see Table 2). In particular, the finance, insurance, and real estate, and wholesale sectors are now major sources of employment. State and local government impact is lagged by one year. There are also lagged structures in the finance, insurance, and real estate and service sectors where employment peaks at 493 and 1,895, respectively, in 1992, while total employment peaks in 1989. This may be due, in part, to the lagged nature of firms' behavior in expanding capacity. Firms with excess capacity may purchase few of these services while they move toward full capacity. Additions to capacity may involve more use of financial and business-oriented services in the form of employee compensation, insurance, management and information systems, and so on. It is also not too surprising that both the durable manufacturing and wholesale sectors peak in the same year as total employment as much of their initial increases in output are probably met by additions to labor rather than capital. Roughly 60 percent of the impact shown in Table 3 is attributable to intermediate and consumer demand.

The REMI model also generated employment demand by occupation through a link with the national Occupations by Industry Matrix. Of the 94 occupations generated, miscellaneous administrators and clerical workers are among the occupations experiencing demand in excess of 100 in 1987. Other occupations in high demand, such as secretaries and repair service persons, are vocational and semi-skilled. Professional occupations such as various engineering, health, technical, and research positions are in surprisingly low demand. For example, the demand for electrical engineers peaks at 17 in 1989 and falls to 7 in 1995.

Multiregional Impact

The multiregional impact of Diamond-Star is summarized in Table 3. The bulk of all the impact will occur in Regions 3 and 5. Together, they account for 94 percent of all employment and income and 96 percent of output generated. Of this, 30 percent, or roughly 2,500 jobs, are generated through induced consumer spending. Most of the effects of employment, income, and output are found in the durables, services, retail, and wholesale sectors.

The effects on the relative costs of production, however, are much more pronounced in Region 5. For example, in 1990 the cost of production in Region 3 is estimated to have increased by $260,000, where the same figure in Region 5 is over $4 million. Export employment will fall in all sectors except durable manufacturing in Region 5. The decline in export employment can be attributed to two factors. First, because the model assumes that firms are sensitive to factor costs, some firms may have left the region due to increases in production costs. However, because industrial output has also increased, it is possible that firms once producing for export have penetrated local markets and are now supplying other local firms. Thus, the fall in export employment does not necessarily imply a proportional loss of jobs.

Table 2. Statewide Employment Impact by Major Industry from Diamond-Star Production Phase*

	Total	Durables	Finance/ Insurance/ Real Estate	Retail	Wholesale	Service	Government
1987	3,526	1,749	171	347	265	664	0
1988	7,443	3,451	397	853	561	1,536	118
1989	7,821	3,361	461	984	581	1,762	249
1990	7,784	3,250	481	1,003	581	1,826	266
1991	7,680	3,132	492	998	576	1,877	262
1992	7,503	3,017	493	974	568	1,895	257
1993	7,280	2,911	486	941	556	1,881	250
1994	7,058	2,816	479	901	543	1,865	241
1995	6,860	2,734	480	873	524	1,841	232

*Because residual employment impact is felt on other sectors, sector totals do not sum to total impact.

Table 3. Peak Aggregate Impact by Region*

Region	Employment (persons)	Income ($Billions '82)	Output ($Billions '82)
1	159	.009	.019
2	148	.010	.019
3	3,302	.251	.473
4	84	.008	.010
5	6,040	.429	1.273
6	56	.014	.020
7	87	.005	.012

Regional impact peaks in different years. Thus, column totals do not equal state totals.

The impact on state and local government and service and retail sectors are mirrored by population response in Region 5. By 1991, it is estimated that this region will be a net gainer of population of almost 5,000. The consumer price index is estimated to increase by 1.7 percentage points through the forecast period. Rising rates of inflation are a common by-product of rapidly increasing demand, and the residents of this region should expect an inflationary period starting in 1991.

While we should expect many of the economic effects to occur in the region of impact, the concentration of impact in the Chicago region illustrates the strength of its economic links and its industrial dominance over other regions. Because Regions 3 and 5 already have the highest per capita incomes and receive the largest impact from Diamond-Star, effects there will only marginally affect regional economic imbalances in Illinois.

The impact to Regions 1, 2, and 6 is smaller than that of Regions 3 and 5 by at least a factor of ten. Only 5 percent of the employment and income effects and 3 percent of the output effects reach these regions combined. This impact is negligible. Region 1 experiences the greatest employment impact of the three in 1990 when employment increases by 159. Income and output impacts are greatest in Region 6, but these only amount to increases of 0.3 percent and 0.1 percent, respectively, of their 1985 levels. Income effects are partially off-set by a modest increase in the rate of inflation. In Region 1, increases in disposable income peak at $7 million in 1991. However, population is forecast to reach nearly 636,000 in total. Thus, additions to per capita income equal only $11. The cost of production rises slightly over the forecast period, and labor intensity drops. But in both cases they are insignificant. In general, according to this forecast, these regions have little to gain from the Diamond-Star Operation.

Regions 4 and 7 are the regions least affected by the Diamond-Star project. Although they share geographic borders with Region 5, they are economically the most distant from it. This is primarily due to the paucity of durable manufacturing and wholesale industries, which have been shown to be highly linked to the economic activity in Region 5. In fact, these regions seem to have no particular relative concentration of any industry. Although the regions are forecast to experience marginal income effects, these will be more than off-set by the resulting rate of inflation. Any population increase, and there is some anticipated, will probably be due to natural increase rather than net in-migration.

Concluding Remarks

The purpose of this study has been to assess the economic impact of Diamond-Star on Illinois and its seven regions. Implicit in this report are assumptions that Diamond-Star will reach full production according to their anticipated production schedule and that the autos assembled there will be competitive and successful in the American market. No attempt has been made to simulate the impact of Diamond-Star if it does not reach full production or, conversely, if output exceeds the predicted 240,000 autos per year.

It has been reported, however, that 40-60 percent of the inputs used by Diamond Star will be imported from Japan. Among those imported inputs are engines, transmissions, and various plastic components. This will have significant consequences for the amount of impact we should expect from Diamond-Star. The importance of intermediate and consumption-induced employment and income have been demonstrated, and the importation of large quantities of inputs implies that many of Diamond-Star's indirect effects will not be realized. This fact points to the opportunity for policies and strategies designed both to enhance the total impact of Diamond-Star and to lessen regional disparities in the state. The encouragement and marketing of firms to supply Diamond-Star located in other regions of Illinois will contribute to a more equal geographical distribution of wealth and employment opportunity. Considering the expectation of imported inputs, the figures presented in this report should be considered upper bounds to the ultimate impact.

The study illustrates the relationship between employment and income and the importance of household spending in generating employment. The spending of wages and salaries has been shown to account for approximately 30 percent of the employment impact. The only policy implication is that the location of suppliers as well as the potential for income generation of major employers should be considered as important criteria as are employment estimates when directing state monies to attract big business.

Harrison S. Campbell, Jr. is a program and policy analyst with the Institute of Government and Public Affairs at the University of Illinois at Urbana-Champaign. The research for this report was conducted while he as a graduate student in the Department of Geography at the university.

The REMI model used in this study is maintained at the Illinois Department of Energy and Natural Resources. A list of references is available from the author upon request.

BARBARA J. THOMAS and BARBARA F. RESKIN

Change and Sex Integration in Real Estate Sales

The field of residential real estate sales has been open to women for years. In fact, in 1933 the Virginia State Board of Education characterized residential sales as "an appropriate occupation for women." However, women have always been a minority of real estate sales people. Labor shortages during World War II first brought significant numbers of women into the occupation, and after 1950 one in every seven brokers and sales people was female. Women's representation among brokers and salespersons grew steadily over the next 20 years and then increased sharply during the 1970s (see Table 1). By 1980, over half of all agents and brokers were women. Why did the sex composition of real estate sales people change so dramatically? To answer this question, we examine changes in the industry and occupation, using recent survey data from the National Association of Realtors® and the Illinois Association of Realtors, government publications and other documentary sources, and interviews with Illinois real estate sales people.

Table 1. Employment in Real Estate Sales, by Sex: 1970, 1972, 1977–1981 (*in thousands*)

	Males	*Change*	*Females*	*Change*	*Percent Female*
1970	178	—	84	—	31.9
1972	221	43	128	44	36.7
1977	282	61	220	92	43.8
1978	305	23	250	30	45.0
1979	312	7	304	54	49.4
1980	287	−25	295	−9	50.7
1981	282	−5	280	−15	49.8

Source: US Bureau of the Census, 1973, 1978, 1979, 1980, 1981.

Real estate agents include sales people and brokers, who, together, made up 88 percent of all workers in real estate sales occupations in 1980 (see Table 2). Agents enter the occupation by acquiring a sales license. Some later earn a broker's license, which permits them to carry out certain transactions and manage real estate firms. Most sales people begin in residential sales, and the majority of sales people (82 percent) and brokers (68 percent) remain in that specialty. The primary alternative is commercial sales, which deals with income-producing property such as shopping malls, office buildings, and residential units. A major attraction of commercial over residential real estate is its higher earnings. Commercial brokers earn the second highest median income among the specialties (see Table 3). In addition, since commercial agents deal with business properties, they are less likely to work evenings and weekends. Those selling residential real estate spend most of their time obtaining listings—often on the telephone—and showing property.

Table 2. Total Employment in the Real Estate Industry and Employment of Brokers and Salespersons, 1960–1982

	Total Employment[a] (in thousands)	Percent Change over Previous Five Years	Real Estate Brokers and Salespersons (in thousands)	Percent Change
1960	750	—	—	—
1965	795	6.0	—	—
1970	881	10.8	262[b]	—
1975	1,054	19.6	422	61.1
1980	1,384	31.3	598	41.7
1982	1,336	−3.5	534	−10.7

[a] Source: US Department of Labor, 1984.
[b] Source: Bureau of Census, 1973.

Table 3. Median Income of Brokers by Primary Business Specialty, 1974–1983

Business Specialty	1974	1980[a]	1974–80 Decline in Real Income (%)	1983[a]	1974–83 Decline in Real Income (%)
Residential	$20,000	$15,135	24.3	$12,370	38.2
Commercial	30,000	23,740	20.9	23,460	21.8
Industrial	25,000	22,365	10.5	NA	NA
Farm & land	22,000	19,854	9.8	13,860	37.0
Property management	25,000	20,631	17.5	21,380	14.5
Appraising	25,000	20,930	16.3	14,850	40.6
Building & development	33,500	24,279	27.5	24,750	26.1
Syndication	NA	NA	NA	NA	NA
Other	28,000	20,452	27.0	NA	NA
All brokers	24,000	17,282	28.0	14,850	38.1
N	NA	NA		1,154	

[a] In 1974 dollars
NA—Not available.
Source: National Association of Realtors®.

Within real estate sales the sexes are segregated in two ways. First, women and men are concentrated into different occupational specialties, with most women in residential sales and men dominating the more highly rewarded nonresidential specialties. Second, they hold different positions. Women work disproportionately as sales people, while men hold most managerial (broker-manager) positions. In a survey of 664 Illinois sales people, fewer than 4 percent of the female respondents worked in nonresidential specialties, compared to 21 percent of the men. With respect to positions, of the survey respondents women were 62 percent of the salespersons but only one-fifth of the brokers, compared to 44 and 40 percent, respectively, of the men. Although any salesperson can take the classes and the examination for a broker's license—and more women are doing so—women's limited opportunities to become broker-managers (among Illinois brokers and sales people, women who held brokers' licenses were half again as likely as similar men to be associate brokers rather than broker-managers) reduce their incentive to get a broker's license.

Sex segregation is linked to the wage gap between real estate saleswomen and men. In 1980 women in real estate sales averaged 65 percent of what men earned, which was only two cents per dollar better than how all women in the labor force fared compared to all men. Because earnings are based primarily on commissions, we must ask whether performance differences account for this wage gap. However, within residential sales in 1983 full-time saleswomen in a national sample of real estate sales people earned 90 percent of what similar men earned. Wage data suggest that a more important factor is sex segregation within real estate sales. Residential sales, in which women are concentrated, yields the lowest average income of all specialties. Moreover, brokers, most of whom are male, typically out earn salespeople (see Table 3). Furthermore, among brokers the gap between male and female earnings is larger than the gap for all real estate salespeople—a woman broker averages 55 cents for every dollar a male broker makes.

Explaining the Changing Feminization of Residential Real Estate Sales

Women's increasing representation among real estate sales staff reflects a growing demand for salespeople that men could not satisfy, the attraction real estate sales held for women, and occupational changes that facilitated women's entry into the occupation. Demand factors are necessarily more important—the shortage of agents itself helped produce the supply of women eager to try their hand at selling real estate—so we begin by considering the factors that enhanced the demand for women in real estate sales.

Factors Increasing the Demand for Women in Real Estate Sales

Between 1960 and 1980 the real estate industry thrived, and this long period of growth created a demand for sales staff. In the 1970s the employment of real estate sales people and brokers more than doubled (see Table 2). After World War II returning servicemen eligible for FHA mortgages created a boom in the housing market. The growing industry depleted the primary source of sales people—men—and fueled the demand for an alternative labor supply. The industry underwent several major changes including economic fluctuations, invasion by franchised chains and conglomerates, transformation of the employment status of sales people, stiffer licensing requirements, and new paths into the occupation. All these events affected the sex composition of real estate sales personnel: some made real estate sales less attractive to men, thereby creating a demand for women; others made it more accessible to women.

Responses to Economic Uncertainty and Shifting Competitive Conditions

The residential brokerage industry has always been vulnerable to economic fluctuations. The growth of nationally franchised firms such as Century 21 and national conglomerates such as Coldwell Banker and Merrill Lynch in the 1970s contributed to the shifting sex composition by creating a large number of new sales positions. In 1972, Century 21 was founded, and by 1981 there were seven national chains and 48 regional operations. Profit-sharing agreements give these chains an incentive to acquire a large sales force without any countervailing economic disincentives. To do this, they developed recruitment programs with features likely to attract women.

Education, Licensing, and Entry into Real Estate Sales

All states require real estate agents to be licensed. To qualify, an applicant must be a high school graduate, and most states require 30 hours of classroom instruction to take the licensing examination. High schools, vocational schools, colleges, universities, and real estate firms offer courses in real estate. Applicants must pass a written test; and before a license is issued, they must submit the name of the broker with whom they will be associated. Employers emphasize personality traits as "fully as important as academic background." Compared to many comparable white-collar occupations, these entry requirements are not demanding and make real estate relatively accessible to persons who do not have a college degree or the opportunity to undertake extensive training before embarking on a new career. These characteristics describe many older women who entered or reentered the labor force during the 1970s.

The increased educational requirements for the license that most states imposed in the early 1970s may have attracted women to real estate sales, because they gave rise to community college courses widely advertised in college catalogs. Before such courses were available, prospective sales people who needed help in their studies had to turn to a licensed salesperson—who was usually male. To the extent that sex discrimination existed, this system put women at a disadvantage. The development of college classes created a formal channel into the occupation. As one male broker we interviewed put it, "We set up a mechanism for people to get into this business that worked for men and women, and there were a lot more women out there at the time who wanted to get in . . . if they knew how to." Increased educational requirements and high-visibility advertising campaigns also improved the image of real estate sales, and this more professional image attracted several of the women we interviewed.

Employee versus Independent Status

Sales people are associated with brokerage firms either as employees or as independent contractors. If the arrangement with the broker permits the sales people to work when they please, and if they are permitted to find their own prospects and generally work on their own, their status is that of an independent contractor. As independent contractors, sales people must pay their own withholding taxes and secure their own health insurance and retirement plans. They must also assume the transportation costs incurred in showing property. In the 1970s the federal government increased its regulation of brokerages, and in 1982 the Tax Equity and Fiscal Responsibility Act (TEFRA) imposed requirements for independent-contractor status to ensure that sales people would not be treated as employees for federal tax purposes. This act encouraged brokers to shift employees to independent-contractor status. Such a change was in firms' interest because it saved them the expense of social security, unemployment insurance coverage, pension plans, and fringe benefits. Subsequently, this simplified bookkeeping and the costs associated with it. Now over 90 percent of brokerages use independent contractors exclusively.

The shift of sales people from employees to independent contractors, who received neither salary nor benefits, made real estate sales less attractive to primary wage earners who are predominantly male. Since women in the social classes from which real estate sales people are drawn are less likely than men to be primary wage earners, and married women can usually rely on their husbands' regular income and are covered by their health insurance, independent-contractor status appears to be less of a deterrent to women than to men. In addition, by reducing firms' personnel costs, the independent-contractor system reduced firms' economic disincentives associated with hiring workers whose productivity sex stereotypes might have prompted brokers to question. An 11-year female sales veteran, who began selling residential real estate when other industries were reluctant to hire a woman with a baby for a sales position, illustrates this point, "Real estate people didn't inquire into my personal life or question my ability to put in enough time because [I didn't] get a salary."

The economic fluctuations of the late 1970s exacerbated the negative effect that shifting employees to independent-contractor status had on attracting men since they made commission-based earnings less popular with prime wage earners. After 1974 real median income declined more in residential sales than in commercial and most other specialties (see Table 3).

Thus, new and more highly rewarded real estate specialties, such as condominiums, cooperative management, and syndication, attracted men away from residential sales, leaving vacancies that women filled.

Cultural Attitudes, Occupational Sex Labelling and Discrimination

Industry informants reported that in the past many firms refused to hire women and that some residential customers preferred male sales people. In addition, until the 1960s employment outside the home was not generally acceptable for middle class married women, especially mothers, and firms discriminated against such women. One interviewee told us, "If they had a grade school kid, even a high school kid, we wouldn't let them in real estate in those days." The increasing need for two incomes in a household and the women's liberation movement jointly eroded such attitudes and, along with the economic downturn of the 1970s, prompted public acceptance of the employment of married women with children.

Those forces and the pressure they engendered for equal opportunity led firms that had previously barred women to hire one or two in residential sales. According to agents we spoke with, the success of these pioneers weakened any remaining resistance. In fact, several brokers we interviewed described the ideal residential salesperson as female—a young married women with children and a successful husband—because they assumed she would be energetic, well organized, have contacts, and be used to nice possessions. Thus, residential sales is being relabelled as "women's work."

Explaining the Increased Supply of Women Available for Residential Sales

At the same time that the demand for women salespersons was growing, so too was the supply of women interested in selling residential real estate. The number of women in the labor force grew dramatically during the late 1960s and early 1970s, producing thousands of new workers on which occupations could draw. A variety of factors channeled significant numbers of this group into residential sales.

Sex-role Socialization. Traditional sex-role stereotypes are important in relegating women to residential sales. Personality traits thought to be related to success in residential sales are consistent with traditional female sex roles. In its 1933 edition of *Vocations for Women,* the Virginia State Board of Education listed as qualifications for real estate sales: tact, a pleasing personality, confidence, initiative, good judgment, and the ability to work harmoniously with various classes of people, all characteristics stereotypically associated with women. One commentator claimed that women know how to sell houses because they understand "feminine psychology" better than men and can point out a home's advantages from a woman's point of view. He contended that this is important because ultimately most wives decide which house to buy. Other stereotypically female traits that are useful in residential sales include diplomacy, a desire to please, and nurturance. In many respects, residential sales involves "emotional work," the production of emotions in oneself and others, which is a traditionally female form of work. Salespersons we interviewed illustrated this idea, pointing out that women are more patient when buyers are trying to reach a decision. In one's words, "They're willing to wait while someone discusses their ambivalence about a yellow bathroom." Moreover, the traditional sexual division of labor that assigns to women the primary responsibility for home care ensures women's interest in houses, and hence their expertise and legitimacy in the minds of buyers. A successful woman broker pointed out, "Women come into real estate knowing how many cupboards a kitchen should have in order to store a respectable number of pots, pans, and staples. . . . They know a lot about houses—more than most men. That's why they do so well."

Knowledge of the Occupation. Women have several ways in which they can learn about career possibilities in residential sales: when they buy or sell a home; from working in a nonsales job in a real estate firm; from seeing women realtors in television commercials or magazine advertisements; from recruitment efforts by firms; through friends and relatives; and from junior college and university course catalogs. As more women sold real estate in the 1950s and 1960s, more female role models were available to women looking for an occupation. To the millions of American women who buy or sell homes every year, real estate sales appears to be a lucrative occupation that does not require specialized training. After 1971, even women who had never personally come into contact with a female realtor saw women selling houses in television commercials for national franchises or in photographs of real estate sales personnel in newspaper home-buyer guides.

Flexible Working Hours. As independent contractors, salespersons are free to make their own schedules and do not need to ask permission to take time off. A job that does not require a 9-to-5 workday, 50 weeks a year is attractive to women with family responsibilities. For example, in 1960 a commentator characterized residential real estate as a "natural field for women," since it provides the flexibility many occupations lack to schedule appointments to accommodate domestic responsibilities. When asked what attracted them to the field, more women we interviewed mentioned flexibility and independence than any other factor. For example, a broker who had been a teacher said she wanted to return to work when her youngest child entered kindergarten, "and real estate had more flexible hours than teaching." Another summarized the typical woman's reasoning as, "I'll go out and sell houses while Susie and Johnny are in school. I can be home when they get home so it won't disrupt my family life."

Thus, newcomers are attracted by the perception that real estate sales will accommodate their family roles. This image is not totally well founded. Customers call agents in the evenings and on weekends, and agents spoke of long work weeks spilling over into weekends. However, even if residential sales is less flexible than many newcomers believe, independent-contractor status does let women take off blocks of time to schedule family events if they can get a colleague to cover for them. Thus, both perceived and actual flexibility contribute to the occupation's attraction for women with families.

Income Advantages. Real estate sales offers three potential income advantages to women. First, many women mentioned the attraction of a job in which their income is not depressed by their sex. As a recent college graduate said, "We don't have to battle for equal pay for equal work in this business. There's no rule, thank God, that if a sale is made by a man the commission will be 6 percent, if by a women, 3 percent." Although payment based on commissions precludes wage discrimination, it does mean an irregular income. However, this problem is less serious for persons who are not the sole support for themselves and their families. Thus, real estate may be particularly attractive to married women whose husbands earn enough to sustain their families.

Second, as independent contractors, real estate agents work on a commission basis, receiving a percentage of the sale price of their listings and sales. Thus, only time and energy restrict their earnings. Several saleswomen indicated that their overall earnings are higher than they had been in their previous jobs or other jobs for which they felt qualified. One said, "If I had stayed in elementary teaching, I probably wouldn't make [even] 50 percent of what I do." Indeed, real estate sales provides above average wages for women. In 1980 the mean hourly earning of women in real estate sales was $7.19, while experienced female members of the civil labor force averaged $6.10 an hour. The potential gain is even greater for secretaries and bookkeepers, the most common occupational origin for real estate salespeople. In 1980 female secretaries and bookkeepers made $5.14 and $4.98 an hour, respectively.

A third attraction is the popular belief that real estate sales is a very lucrative occupation, fostered by books such as *How Any Woman Can Get Rich Fast in Real Estate.*

Explaining Women's Underrepresentation in Nonresidential Real Estate

Because it is easy to enter, residential sales is the "port of entry" into real estate sales. Many men tend to move on into nonresidential sales and management, but most women remain in residential. Women's underrepresentation in commercial sales occurs both because the field is still sex-typed as a male field and because it is more difficult to enter. A commercial license requires more classroom hours as well as business and mathematical training. Because custom has discouraged women from pursuing business and mathematics in school, these requirements are more likely to deter women than men.

Cultural Attitudes, Occupational Preferences, and Sex-Role Socialization. Industry insiders still see commercial sales as a male specialty. For example, one interviewee remarked, "I think a good number of men would feel that [commercial] is a man's field and that they can do a better job." Commercial sales has the reputation as a tough, risky business where deals are made in smoke-filled rooms. Some informants characterized men in commercial sales as "high rollers" who are attracted by the risk that commercial real estate involves.

Explaining women's underrepresentation in nonresidential sales and their gains in residential real estate in terms of sex-role socialization is appealing because it fits popular notions of how people behave, but structural aspects of the occupation are also important in producing sex segregation within real estate sales. For example, just as many women learned about opportunities in residential real estate through buying and selling houses, the commercial sales people whom we interviewed learned about their occupation through buying a selling investment property or managing property. Because these are not typically female activities, women have fewer chances to learn of the opportunities commercial real estate sales offer. In addition, most people we interviewed agreed that some brokers refused to hire women for commercial sales, and others would only allow a small percentage of women in their branches. Some saleswomen told us that brokers did not want women on their staffs because they did not think women could handle commercial. For example, one saleswoman experienced opposition when she tried to move from residential to commercial sales, after she had a chance opportunity to handle a commercial sale. "The men in the office didn't let me do it. My boss said, 'If you want to do that, go someplace else, because that's no place for a woman.' " Another saleswomen said her firm's executive committee had to approve her when she was hired in 1973: "All the men went in [easily] . . . with me it was five months." Several brokers we interviewed confirmed these accounts of sex discrimination in commercial real estate; a male broker indicated that many commercial firms that appear open to women are just paying "lip service" to equal opportunities for women.

Most agents we interviewed believed that commercial customers, who are predominantly male, are indifferent to a salesperson's sex as long as she or he is competent, although a few claimed that customers still prefer to deal with men and that women in commercial must prove themselves by being more professional than their male counterparts. Some of the barriers women described to us were subtle. Some commented that female agents must act differently from male agents—they cannot be "buddy-buddy" with their customers, conducting business at the golf course or bar. Thus, according to our sources, would-be commercial saleswomen have to overcome more resistance from employers than from customers.

Barbara Reskin is a professor in the Department of Sociology, University of Illinois at Urbana-Champaign. Barbara Thomas is a graduate student in the department. Support for this study came from the Office of Real Estate Research and the National Science Foundation.

TIMOTHY J. GALLAGHER

Mutual Fund Size and Risk-Adjusted Performance

The *Wall Street Journal* described the ongoing debate over the relationship between mutual fund size and performance in the 5 June 1986 edition. Laura Berger of the No Load Mutual Fund Association was quoted as saying, "The smaller the fund the better the performance." A study conducted by Lipper Analytical Services was quoted, and it found that larger funds outperformed smaller funds in four of five categories tested.

There are many people, such as Berger, who have a gut feeling that small mutual funds should outperform large mutual funds. The flexibility of smaller funds is often referred to as a big advantage. The manager of a small fund can get in and out of the market quickly without disrupting it. He can also move from one stock to another easily. Buy and sell orders are not likely to move the market adversely, resulting in better "fills" for the small fund.

Large funds have more resources and can afford to buy the services of the highest priced (best?) portfolio managers. They can negotiate lower commission charges and can take advantage of economies of scale. The Lipper study suggests that these advantages of large funds outweigh the relative advantage of which small funds have in certain areas.

The Lipper study has one serious limitation. It does not adjust for risk when measuring performance. Funds that take bigger risks should perform better than funds that take smaller risks. Rather than making subjective judgments about the relationship between size and performance or doing a study using simple returns to measure performance, this study examines the relationship between size and risk-adjusted returns.

Risk-Adjusted Returns of Mutual Funds

Performance figures were gathered quarterly for 45 mutual funds and the Standard & Poor's 500 Index from Barron's/Lipper Gauge of mutual fund performance. The Lipper Gauge reports the performance of a hypothetical $10,000 investment during a given holding period (quarter, year, and 5-year periods). The ending value of this $10,000-beginning-value investment is reported. Sales charges and redemption fees, if any, are ignored. All distributions are assumed reinvested on the ex-dividend date. Holding-period returns (Ending Value − $10,000/$10,000) were calculated for mutual funds for each quarter from 1 January 1982 through 31 March 1987 (22 quarters). The first quarter of 1982 is when *Barrons* began publishing the Lipper Gauge.

The 22 holding-period returns were obtained, and the geometric mean of these returns was calculated for each mutual fund in the sample. Maximizing the geometric mean return for a given risk level is widely accepted as a good investment goal.

The geometric mean returns were then used to calculate two different risk-adjusted return measures for each mutual fund. In both cases, the risk premium for each mutual fund is computed. It is defined as the geometric mean rate of return minus the riskless rate of interest. On 1 January 1982 an investor could have purchased a Treasury bond scheduled to mature in March 1987 with a yield to maturity of 14 percent. This yield, converted to a quarterly return of 3.3 percent, becomes the riskless rate.

The Sharpe Index takes the risk premium and divides by the standard deviation of the holding-period returns. The Sharpe Index gives us the amount of return above the riskless rate paid to induce investors to assume risk per unit of total risk. In the ex-post world we live in, this risk premium can be positive or negative. Ex ante, the expected risk premium is always positive.

Treynor uses the same numerator in his performance index. However, instead of dividing by the total risk measure he uses beta in the denominator. The Treynor Index gives the risk premium per unit of systematic risk. Beta was calculated by regressing the holding-period returns of each mutual fund against the holding-period returns of the Standard & Poor's 500 Index with dividends fully reinvested.

The size variable used in this study reflects the dollar amount of total assets of each mutual fund at the beginning of the observation period (31 December 1981). Although the sizes of these sample mutual funds changed over the observation period, a potential investor could not predict these changes; so the beginning size figures were used.

The 45 funds are ranked according to asset size from largest (rank 1) to smallest (rank 45). Each fund (including Standard & Poor's 500 Index) is then ranked according to performance from best (rank 1) to poorest (rank 46) Performance is measured in three different ways: the geometric mean holding-period return, the Sharpe Index, and the Treynor Index. The Pearson correlation coefficient is calculated to test for a possible relationship between mutual fund size and performance.

Results

Table 1 shows the geometric mean returns, betas, the Sharpe Index, and the Treynor Index for each of the 46 funds. The best performer, without adjustment for risk, was Sentinal with an 8.37 percent geometric mean quarterly return. 44 Wall Street fund was the poorest performer with a −2.32 percent geometric mean quarterly return. The geometric mean quarterly return of the Standard & Poor's 500 Index (with dividends reinvested) was 5.36 percent. Of the 45 sample mutual funds, 31 beat this benchmark buy-and-hold portfolio on an unadjusted basis.

Sequoia, not Sentinal, gets the number one ranking when the Sharpe and Treynor risk-adjusted performance measures are examined. Sentinal drops to number three according to the Sharpe Index and to number six according to the Treynor Index. Sequoia had a value of .78 for the Sharpe Index and 13.30 for the Treynor Index. 44 Wall Street had a −2.32 percent quarterly geometric mean, a −.28 for the Sharpe Index, and −3.36 for the Treynor Index coming in at last place however performance is measured. The Standard & Poor's 500 Index reinvested was 2.06. The Standard & Poor's Index reinvested beat 31 of 45 mutual funds in this random sample according to the geometric mean, 34 of 45 according to the Sharpe Index, and 39 of 45 according to the Treynor Index. The mutual fund managers seem to be doing very well, especially on a risk-adjusted basis, according to these data. Next the evidence on the relationship between mutual fund size and performance will be examined.

The results of the correlation coefficient calculations are summarized in Table 2. The null hypothesis is that there is no relationship between size and performance. Only the .311 correlation coefficient of geometric mean and size is significant at the .05 level suggesting that there is significant difference between the performance of small and large funds (large funds do better). The results from the risk-adjusted performance measures suggest that the null hypothesis (no relationship between mutual fund size and performance) cannot be rejected at the .05 level of confidence.

The Sharpe and Treynor Indexes are both widely used as measures of risk-adjusted performance. They tend to rank portfolios similarly, and the results of this study support that observation strongly. The rank correlation coefficient between the Sharpe Index and the Treynor Index is .869. The probability that this correlation coefficient is in fact zero is .0001.

Table 1. Quarterly Performance of 46 Funds 1982:I to 1987:II

Mutual Fund Name	*Asset Size ($mil)*	*Size Rank*	*Geometric Mean Return (%)*	*GMean Rank*	*Beta*	*STD*	*Sharpe Index*	*Sharpe Rank*	*Treynor Index*	*Treynor Rank*
Acorn	105.9	27	6.43	18	.93	10.11	.31	21	3.37	29
Affiliated	1580.6	3	7.35	10	.67	8.74	.46	11	6.00	15
Amer. Leaders	43.2	35	6.93	14	.53	6.42	.57	6	6.84	12
Axe-Houghton	141.5	22	6.84	15	.64	8.16	.43	15	5.52	17
Commerce Inc.	46.8	34	5.12	35	.69	6.85	.27	29	2.63	37
Composite	24.1	39	4.61	42	.39	6.71	.20	39	3.41	28
Decatur Inc.	359.2	13	7.53	5	.55	7.30	.58	5	7.75	8
Delaware	226.8	18	7.44	9	.94	10.33	.40	17	4.43	25
Dreyfus A Bond +	25.2	39	4.60	43	.21	4.56	.28	24	6.20	14
Dreyfus	1635.9	1	5.71	29	.53	7.58	.32	20	4.53	24
Elfun Trusts	265.0	16.5	7.12	11	.81	8.80	.43	14	4.71	23
Fidelity Fund	490.2	8	7.48	8	.85	9.81	.43	16	4.95	22
Fidelity Trend	537.1	7	6.07	22	.93	10.84	.26	33	2.96	33
1st Inv Growth	58.4	31	2.86	45	1.21	13.25	−.03	45	−.36	44
44 Wall Street	122.2	25	−2.32	46	1.67	19.73	−.28	46	−3.36	46
Fund Us Govt	48.5	33	4.65	41	.16	6.05	.22	38	8.63	3
J Hancock Bond	325.0	14	4.85	40	.21	5.11	.30	2	7.33	9
Hartwell Growth	8.7	42	5.51	30	1.27	17.09	.13	43	1.74	43
IDS Bond	580.4	6	6.48	17	.37	6.70	.45	12	8.51	4
Inc. Fd. of Amer	216.2	19	6.58	16	.42	5.64	.58	4	7.83	7
Inv. Co of Amer	1592.4	2	7.80	3	.86	8.29	.54	7	5.25	20
ISI Growth	13.3	41	5.14	34	.50	7.16	.26	32	3.66	26
ISI Income	8.2	44	3.18	44	.08	5.32	−.02	44	−1.50	45
Janus	40.6	36	5.79	28	.84	8.83	.28	26	2.98	32
Kempr Inc.	78.5	29	5.11	36	.17	4.98	.36	18	10.74	2
Keystone B-4	360.7	12	4.93	37	.31	4.55	.36	19	5.26	19
Putnam Growth	651.3	5	7.01	13	.59	7.85	.47	9	6.35	13
Putnam Income	122.0	26	4.93	38	.31	6.19	.26	30	5.28	18
Safeco Equity	31.5	37	6.05	23	.78	9.92	.28	27	3.64	27
Security Equity	198.3	21	6.05	24	.99	11.47	.24	36	2.77	36
Sel. Amer. Shs.	72.2	30	7.54	4	.51	6.85	.62	2	8.30	5
Sentinal Cm St.	265.0	16.5	8.37	1	.63	8.44	.60	3	8.06	6
Sequoia	134.1	23	7.84	2	.34	5.85	.78	1	13.30	1
Sigma Income	15.3	40	4.87	39	.31	5.87	.27	28	5.16	21
Smith Barn Eq.	50.5	32	6.10	21	.87	9.89	.28	25	3.22	31
Sov Investors	8.5	43	7.10	12	.53	8.15	.47	10	7.25	10
St. Farm Growth	199.2	20	5.47	31	.88	9.76	.22	37	2.46	39
St. Farm Inv.	389.4	10	6.01	25	.93	10.61	.26	34	2.90	35
Stein Roe Cap	126.6	24	5.84	27	1.41	17.34	.15	42	1.81	42
Surveyor Fund	89.3	28	5.98	26	1.37	15.46	.17	41	1.96	41
Technology Fund	478.8	9	6.36	19	1.04	11.74	.26	31	2.94	34
20th Cen. Growth	281.3	15	6.32	20	1.23	15.74	.19	40	2.47	38
Unified Mutual	7.1	45	5.32	33	.62	7.08	.29	23	3.24	30
United Accu.	396.8	11	7.51	6	.75	9.37	.45	13	5.62	16
Windsor Fund	960.8	4	7.49	7	.60	8.23	.51	8	7.03	11
S&P500 Index (Div Reinvested)	–	–	5.36	32	1.00	8.15	.25	35	2.06	40

Table 2. Mutual Fund Size and Performance Correlation Coefficients

	Correlation Coefficient	*Probability Correlation = 0*
Correlation of Geometric Mean and Size	.311	.048
Correlation of Sharpe Index and Size	.270	.088
Correlation of Treynor Index and Size	.142	.375

Conclusions

Large mutual funds perform about the same as small mutual funds on a risk-adjusted basis. There is an appearance of large fund superiority when unadjusted returns are examined, but this superiority mostly disappears when we adjust for risk. These results reaffirm the importance of considering risk differences when measuring portfolio performance. If forced to choose between a large fund and a small one, with no other information to go by, I would probably choose the large one.

Timothy J. Gallagher is an associate professor of Finance at Colorado State University. The author would like to thank Henry Schilling of Lipper Analytical Securities, Corp., for assistance in gathering data, Barbara Frank for assistance, and John Ellis for helpful comments on an earlier draft.

Illinois Business Indexes

The composite leading indicator continues to project growth in the Illinois economy over the next several quarters. In April, the current indicator briefly declined below the trend indicator but rebounded by May (see Chart 1), suggesting that the decline represents a fluctuation around the general upward trend rather than a change in the trend itself.

Although real weekly earnings in the manufacturing sector remained almost constant at $400 over the past two years (see Chart 2), growth in the Illinois economy is reflected by the recent improvement in real retail sales as illustrated in Chart 3. Since January 1988, monthly sales have generally increased over the previous year's amounts.

The help wanted indexes used to construct Chart 4 measure the volume of classified advertising in the respective cities' major newspapers, and are sensitive to changes in the demand for labor and general business conditions. Although the Chicago help wanted advertising index is absolutely higher than the St. Louis index, Chart 4 indicates that the two indexes follow the same general trend. The Chicago index fell by .87 percent in May while the St. Louis index increased by 5.63 percent.

As expected, residential housing permits were lower in the winter months during the past two years due to seasonal patterns (see Chart 5). Despite growth in housing permits during the spring months, however, the current year is showing a weak performance relative to the previous year. Chart 6 shows that area inflation rates have held steady at approximately three to four percent during 1988. Chicago's rate of inflation fell throughout March, April, and May of this year, and the May rate of 3.29 percent was lower than that of the North Central United States (3.94 percent).

ILLINOIS BUSINESS INDEXES

	Percent Change May 1987-May 1988	*May 1988*	*April 1988*	*March 1988*	*Feb 1988*	*May 1987*	*April 1987*
Leading Indicator (Current Indicator)	2.65[a]	13.32	12.50	12.99	13.57	10.67	12.13
Leading Indicator (Trend Indicator)	0.75[a]	13.25	13.08	12.24	11.48	12.50	13.27
Employment-manufacturing (in thousands)[b]	1.81%	943.9	944.4	942.2	938.0	927.1	926.6
Average weekly hours-manufacturing[b]	0.48%	41.6	41.8	41.8	41.9	41.4	41.2
Weekly earnings-manufacturing[b]	2.34%	$460.10	$463.14	$462.31	$463.41	$449.60	$447.43
Help wanted advertising-Chicago (1967 = 100)[c]	2.70%	114	115	116	116	111	105
Help wanted advertising-St. Louis (1967 = 100)[c]	19.05%	75	71	67	69	63	63
Retail sales (in millions)[d]	14.75%	$6,627	$6,135	$6,175	$5,234	$5,775	$6,082
Coal production (in thousands of tons)	8.66%	5,068	4,624	5,200	4,873	4,664	5,457
Petroleum products (in thousands of barrels)[b]	−1.00%	1,980	1,985	2,000	1,990	2,000	2,000
Vendor performance[e]	10.00%	66%	62%	69%	66%	60%	57%
Building permits (in thousands)							
Residential housing units	−9.09%	4.632	4.112	3.208	1.388	5.095	4.624
Value of residential housing	6.24%	$384,122	$346,092	$341,112	$161,368	$361,550	$384,791
Value of nonresidential construction							
Industrial buildings	7.40%	$30,585	$16,511	$13,414	$17,734	$28,477	$37,927
Office, banks, and professional buildings	62.76%	$65,638	$28,256	$91,781	$124,263	$40,327	$46,810
Stores and other mercantile buildings	15.87%	$47,211	$33,886	$37,818	$28,496	$40,746	$26,679
Other	104.00%	$11,589	$5,127	$5,003	$1,565	$5,681	$5,661
Consumer price index (1982-84 = 100)							
North Central US	3.94%	115.5	114.9	114.3	113.7	111.1	110.9
North Central/population more than 1,200,000	3.81%	116.0	115.7	115.1	114.7	111.7	111.4
North Central/population 360,000 to 1,200,000	4.18%	115.7	115.0	114.2	113.5	111.1	111.1
North Central/population 50,000 to 360,000	4.50%	116.1	115.2	114.6	113.4	111.1	110.6
North Central/population less than 50,000	2.85%	112.2	111.8	111.1	110.5	109.1	108.9
Chicago	3.29%	117.0	117.1	116.9	116.6	113.3	112.8
St. Louis	2.54%	114.1	—	114.2	—	111.3	—
		1987:IV	1987:III	1987:II	1987:I	1986:IV	1986:III
Personal income (in millions)[b,f,g]	7.81%	$196,097	$189,115	$186,231	$185,885	$181,893	$180,127
Per capita personal income[b,f,g]	7.50%	$16,886	$16,297	$16,060	$16,041	$15,708	$15,566

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, May 1988; seasonally adjusted. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Seasonally adjusted at annual rates. [g] Percent change between 1986:IV and 1987:IV.

Chart 1. Composite Leading Indicators (*average percent change in base indexes*)

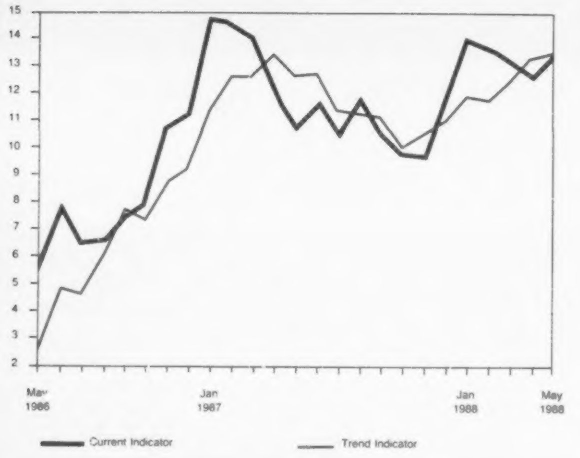


Chart 2. Real Weekly Earnings—Manufacturing

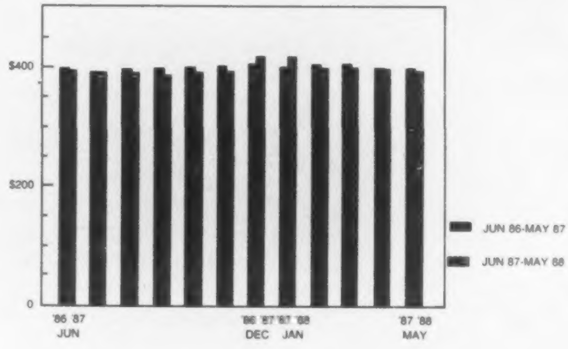


Chart 3. Real Retail Sales (*in millions*)

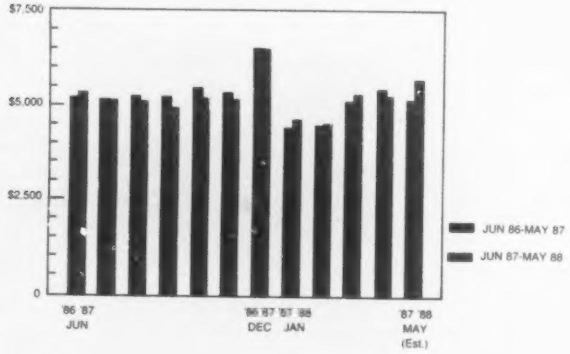


Chart 4. Help Wanted Advertising Indexes (*percent change from previous month, seasonally adjusted*)

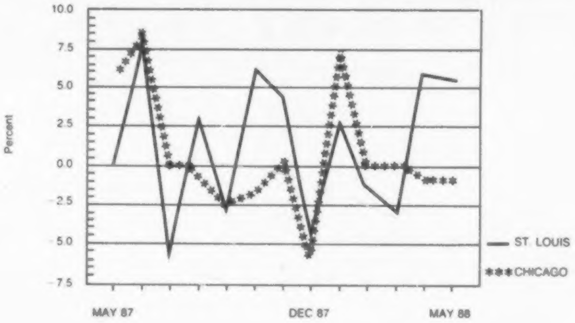


Chart 5. Residential Housing Units (*in thousands*)

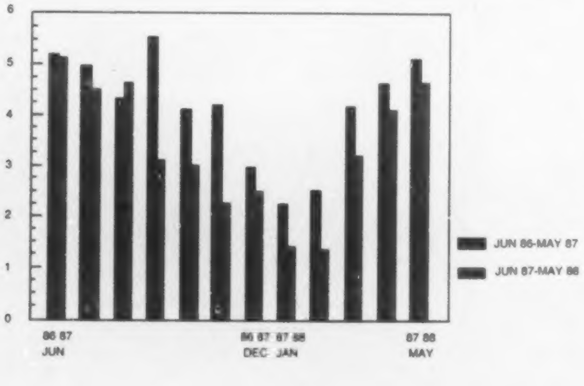
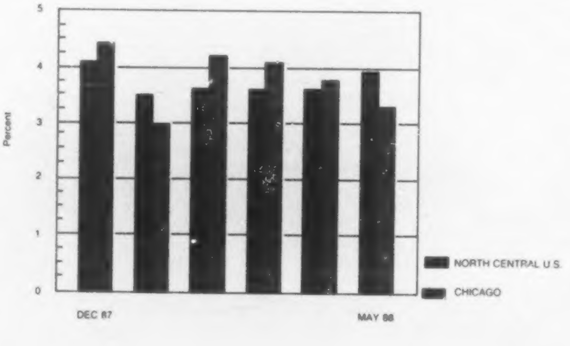


Chart 6. Year-to-Year Change in Selected CPI



Illinois Business Review

Bureau of Economic and Business Research
428 Commerce West, 1206 South Sixth Street
Champaign, Illinois 61820

Second-class postage paid at Urbana, Illinois.

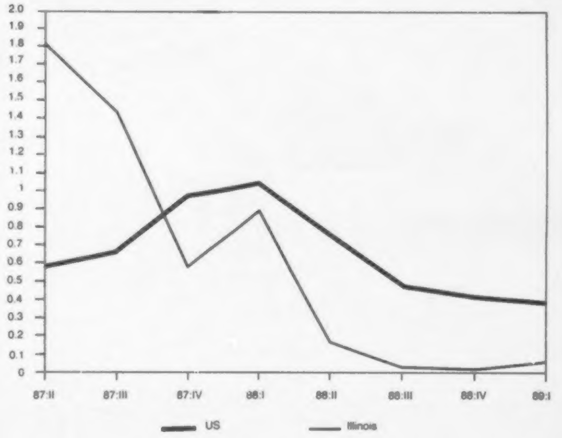
CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

Illinois Economic Outlook

The Illinois Econometric Model forecasts slow growth in employment through the first quarter of 1989. With the exception of mining, each sector of the state's economy is expected to show increased employment levels in 1988. The chart compares job growth in Illinois with the expected performance of the US economy. The rate of growth in Illinois fell below the national level in the fourth quarter of 1987 and is expected to remain significantly below this level for the foreseeable future.

The table presents more detailed forecasts of employment levels in several major sectors of the Illinois economy. While mining, construction, and manufacturing are expected to contribute very little to job growth in the state, the remaining sectors are expected to have a significant impact. The increasing importance of the financial, trade, and service industries illustrates the changing structure of both the Illinois and US economies.

Illinois Employment Growth (*percentage change from previous quarter*)



Illinois Seasonally Adjusted Employment

	History				*Forecast*			
	87:II	*87:III*	*87:IV*	*88:I*	*88:II*	*88:III*	*88:IV*	*89:I*
Total private nonfarm (thousands)	4,128.4	4,187.9	4,212.3	4,250.0	4,257.1	4,258.7	4,259.6	4,262.5
Mining	24.4	24.4	24.0	24.1	23.9	23.6	23.2	22.8
Construction	175.1	178.2	186.8	202.8	198.8	192.5	186.7	182.1
Manufacturing	926.0	930.4	936.5	941.5	936.5	931.7	926.0	920.8
Durable manufacturing	562.4	566.3	569.5	571.4	567.3	563.7	559.7	555.9
Primary metals	55.5	56.0	55.6	54.5	54.6	55.4	55.1	55.5
Fabricated metals	110.9	111.8	110.9	108.9	109.8	109.5	109.4	109.3
Nonelectrical machinery	138.7	139.5	139.4	137.6	138.3	138.3	138.2	138.2
Electrical machinery	117.7	117.7	120.2	122.0	118.6	116.9	114.7	112.7
Miscellaneous durables	139.5	141.3	143.2	149.1	146.1	143.7	142.3	140.2
Nondurable manufacturing	363.7	363.6	367.0	370.1	369.2	368.0	366.3	364.9
Food products	91.7	90.9	91.4	91.2	91.3	91.0	90.8	90.5
Printing and publishing	106.8	106.6	107.1	108.8	109.1	109.0	108.5	107.9
Chemicals	56.9	57.1	57.4	57.8	58.2	58.3	58.5	58.7
Miscellaneous nondurables	108.8	109.2	110.1	111.4	110.5	109.7	108.5	107.8
Utilities and transportation	282.7	284.1	291.4	300.7	295.3	289.9	285.6	282.0
Wholesale and retail trade	1,222.0	1,236.5	1,234.2	1,243.7	1,254.1	1,262.6	1,270.5	1,277.8
Finance, insurance, and real estate	352.2	354.3	357.5	363.7	366.3	367.1	367.4	367.7
Services	1,143.5	1,147.7	1,163.3	1,173.6	1,182.3	1,191.2	1,200.1	1,209.3

Bureau of Economic and Business Research

U6910-1
11/18/88

October 1988
Volume 45, Number 5

Illinois Business Review

Bureau of Economic and Business Research
College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

Value of a College Education / 03

Aircraft Noise and Residential Property Markets / 09

October 1988 Illinois Business Review Volume 45 Number 5

Bureau of Economic and Business Research
University of Illinois, 428 Commerce West
1206 South Sixth Street, Champaign, Illinois 61820

Acting Director, Marvin Frankel; *Editor,* William R. Bryan; *Technical Editor,* Janet R. Fitch; *Designers,* Ronald Sterkel and Kimberly Nyberg; *Research Assistants,* Paul C. Bishop, Edgardo Buscaglia, Robert P. Hartwig, Mary A. Laschober, and Anne E. Winkler.

The material appearing in the *Illinois Business Review* is derived from various primary sources and compiled by the Bureau of Economic and Business Research. Its chief purpose is to provide current information on business conditions.

Signed articles represent the personal views of the authors and not necessarily those of the University or the College of Commerce.

The *Review* will be sent free upon request. Second-class postage paid at Urbana, Illinois, and additional mailing offices.

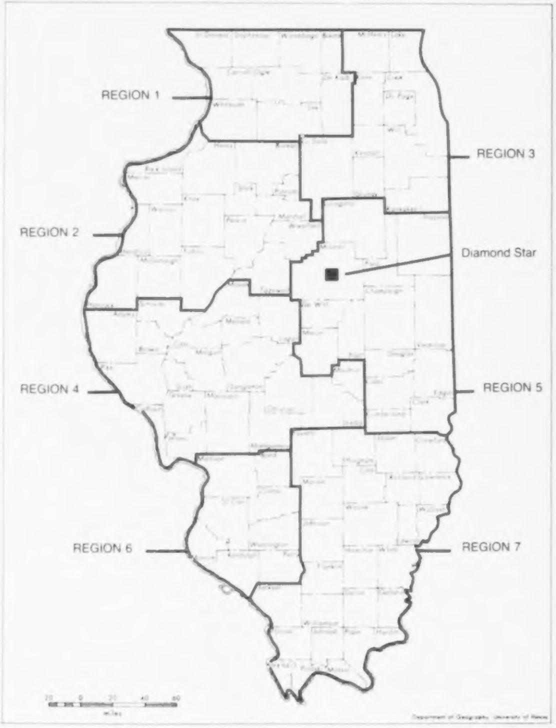
Postmaster: Send address changes to Bureau of Economic and Business Research, 428 Commerce West, 1206 South Sixth Street, Champaign, IL 61820.

(ISSN 0019-1922)
published bimonthly

Clarification

By error, the numbers indicating the regions were left off the accompanying map as it was published in the article, "State and Regional Economic Impact of Diamond-Star Motors," by Harrison S. Campbell, Jr. in the August issue of the *Illinois Business Review.* We reprint the map here with the appropriate region numbers. We apologize for any inconvenience caused to the author and readers.

Illinois's Seven Commuting Regions



WILLIAM R. BRYAN AND CHARLES M. LINKE

Value of a College Education

Colleges and universities throughout the nation have announced tuition increases for the coming year. These increases continue a trend that has characterized the past several decades, and longer. In part, increases in the cost of higher education are an aspect of generalized inflation. Beyond that, however, there have been increases in the relative price of higher education.

In understanding why it is that we are willing to make the major expenditures associated with education and in accounting for some of the reasons that relative costs continue to increase, it is useful to review some of the returns to education. One way of thinking about returns is to identify the gains to society that accrue by virtue of advances associated with education in general or higher education in particular. An alternative way of thinking about the returns to education, the approach taken here, is to concentrate on the gains to the individual. In this article, we identify the extent to which an individual's earnings are enhanced by the education process, or factors associated with that process.

A person with four years of college earned in excess of $11,000 more per year in 1988, on average, than one whose formal education stopped with high school. Over an entire work life the average earnings of a college graduate are substantially in excess of those of a high school graduate.

Education is not the only determinant of earnings. Other important general factors include age, race and sex, occupation, considered individually and in combination. Moreover, data presented here cannot really show that the increased earnings result from a college education, rather than from some other set of factors. The fact that a person has completed college and enjoys high earnings may be a reflection of a host of other considerations—family income, race, personal intelligence and energy, motivation, social status, political power, and so forth.

Data

The earnings data are from *Money Income of Households, Families, and Persons in the United States: 1985*, a 1987 publication of the Bureau of the Census. We give the 1985 data in 1988 dollars by an adjustment formed from the 1985 to 1988 change in the level of consumer prices. The data are limited to earnings, that is, money received for performing work, either as an employee or self-employed.

Data relating to the length of work life are from *Work Life Estimates: Effects of Race and Education*, a 1986 publication of the Bureau of Labor Statistics. An individual's work life consists of the period during which there is participation in the work force. Accordingly, a work life is the sum of periods of time an individual is employed and periods unemployed.

Age-Earnings Life Cycle

Money earnings of workers in general have shown persistent increases over the past half century. In part, the increases have been an aspect of inflation. The earnings statistics discussed here are presented in 1988 dollars, thereby removing the effects of general inflation. Other important sources of gains in earnings include productivity gains—that is, increased output reflecting improvements in technology and other factors. Over the past three decades, increases in real earnings of year-round workers have averaged just under 1.5 percent per annum.

If we shift our focus from workers in general toward the earnings of individuals, there are changes associated with movement through the life cycle. It is generally the case that an individual's real earnings tend to rise over an extended portion of life, then drift lower as he or she nears retirement. The life-cycle pattern is illustrated in Chart 1. The line moving toward the top of the chart shows a college graduate's life cycle of real income assuming an annual increase in productivity of 1.5 percent spread evenly across age categories. The center line depicts the present value of real income across age categories. For a discussion of present value see the accompanying inset. In that discussion we reach the conclusion that factors affecting the growth in earnings are approximately offset by factors affecting the appropriate discount rate. Hence, the present value of an individual's life cycle of earnings is approximated by the sum of constant dollar earnings over the life cycle.

The Concept of Present Value

Choice is one of the most pervasive of human activities. Some of the most difficult, yet common, decision-making involves choice among unlike objects, events, or activities. Other decisions relate to similar, even identical, objects, events, or activities, but involve choice along a time dimension. Shall we do it now? Or shall we do it later? Time emerges as an important economic variable by virtue of the human condition that something received now is inherently more desirable than something to be received later. That human condition probably relates to the fact that each of us ages and, at length, dies. Hence, time is finite to the individual. If an individual forgoes something now, he may never again have the opportunity to experience it.

To compare unlike flows of benefits (or, alternatively, of costs), economists employ the concept of present value. Occasions arise when it is important to compare the desirability of receiving one amount of money now, say $1,000, with the desirability of receiving an alternative amount, say $2,500, at some specified time in the future. Or, we may need to compare the value of the receipt of $1,000 now with the value of receiving a monthly amount of, say, $25 spread over a specified number of months. It is that type of problem that is posed in evaluating a college education. The differentials in earnings between college graduates and high school graduates are spread over a lifetime. In determining whether the expenses of college are worthwhile, it is necessary to determine how much that differential is worth.

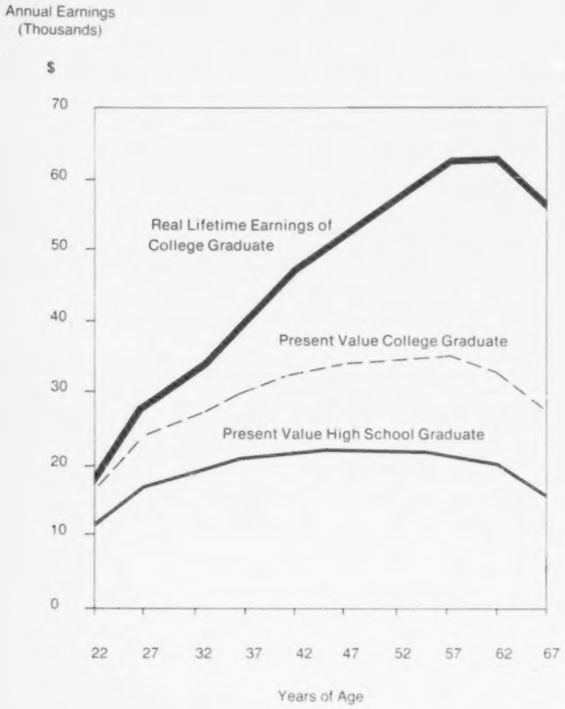
The dominant approach to thinking about the meaning of present value is to pose the following question: What amount, if invested today, would exactly produce the future year-by-year series of payments? In the matter at hand, we are interested in knowing how much would need to be invested to make up for the earnings difference between a high school graduate, variously defined, and a college graduate.

The answer to this present value question depends upon four factors. One ingredient to an answer involves knowing the size of the initial earnings differential between the college graduate and the high school graduate; a second ingredient involves identifying the rate (or rates) of growth in that differential; a third factor involves identifying the discount rate, the yield that would accrue to the invested principal; and the final ingredient involves determining the length of the period over which the differentials are to be experienced.

For the matter at hand, it is probably sufficient to assume that the growth rate in earnings and the rate of return on the principal investment are approximately equal. For a discussion see W. R. Bryan and C. M. Linke, "Estimating the Present Value of a Future Earnings Stream: Some Evidence from Experience with Dedicated Portfolios," *Journal of Risk and Insurance* (June 1988).

Chart 1 also shows present value data for high school graduates. Two points are noteworthy. First, the life cycle of annual real earnings for college graduates is markedly higher than for high school graduates. Second, the growth of earnings persists longer for college graduates than for high school graduates.

Chart 1. Life Cycle of Earnings *(Year-Round Workers, Males and Females, 1988 Dollars)*



Lifetime Earnings

The college graduate works to an older age, on average, than does a high school graduate. A male college graduate who enters the work force at age 22 has a work life expectancy of 37.1 years, implying work to age 59.1. In contrast, a high school graduate entering the work force at age 18 has a work life expectancy of 37.9 years, or to age 55.9.

The work life of females, on average, is substantially shorter than that of males. For a variety of reasons, women are apparently more likely than men to withdraw from the work force for extended periods of time. For example, a female may withdraw from the labor force in order to raise a family. But work life expectancies are derived from cross-sectional data. Thus, the expected work life for females cannot fully reflect the significant changes that have occurred during the past two decades in the roles of women in the labor force.

Factors associated with a college education tend to lengthen a female's expected work life. A female high school graduate entering the work force at age 18 has an expected work life of 27.9 years, or an average work life extending to age 45.9. By comparison, a female college graduate entering the work force at age 22 has a work life expectancy of 28.6 years, implying work until 50.6. As a consequence of the differences in timing of work life patterns, the lifetime earnings of college graduates in general, and female graduates in particular, are further enhanced.

Having set forth data relating to earnings and work life, we are in a position to discuss lifetime earnings. For illustrative purposes, suppose that the average work life is 32.9 years for both an 18-year old high school graduate and a 22-year old college graduate. With this assumption, average lifetime earnings in 1988 dollars for a high school graduate are $596,944 (see Table 1). Average lifetime earnings for a college graduate are $965,633, 61.8 percent greater than for a high school graduate.

Table 1. Lifetime Earnings of High School and College Graduates *(Males and Females Combined, Present Values in 1988 Dollars)*[a]

Annual Age Categories	*Earnings*	*Work Life*	*Lifetime Earnings*
	High School Graduates		
18-24 years	$11,181	7.0	$ 78,267
25-29"	16,950	5.0	84,750
30-34"	18,715	5.0	93,575
35-39"	20,657	5.0	103,285
40-44"	21,443	5.0	107,215
45-49"	22,058	5.0	110,290
50-54"	21,735	0.9	19,562
55-59"	21,420	0.0	—
60-64"	20,065	0.0	—
65 and over	15,310	0.0	—
		32.9	$596,944
	College Graduates		
18-24 years	$16,208	3.0	$ 48,624
25-29"	24,269	5.0	121,345
30-34"	27,012	5.0	135,060
35-39"	30,615	5.0	153,075
40-44"	33,006	5.0	165,030
45-49"	34,336	5.0	171,680
50-54"	34,861	4.9	170,819
55-59"	35,255	0.0	—
60-64"	32,992	0.0	—
65 and over	27,567	0.0	—
		32.9	$965,633

[a] Differences in earnings levels across age categories primarily arise from skill, experience and seniority differences among workers in the respective categories. The figures implicitly reflect present values. The earnings gains that might be expected to accrue over time from general productivity increases, not allowed for in the figures, are approximately offset by the discount rate that would otherwise be applied in the determination of present value.

What factors account for the differential between the earnings of college graduates and high school graduates? Most traditional professions, as well as executive and managerial occupations, require a college education. These occupations typically involve high earnings. In addition, it is frequently the case that such occupations are not physically demanding. Hence, youth may not be an important advantage. Indeed, youth may be a disadvantage. Thus, within these occupations an individual can look forward to a relatively long work life with undiminished earnings.

Because professionals, executives, and managers are substantially insulated from the business cycle, a college graduate may be employed for virtually the entire work life. It is not unusual to encounter professionals who have never experienced unemployment. The data are consistent with this generalization. The sample data include 45,094 men and women who had less than a high school education. Of this group, only 53.6 percent worked year-round or full time. The sample included 49,674 who were high school graduates; among these, 59.1 percent were year-round workers. Finally, the sample included 25,883 who had attended four or more years of college. Nearly three-quarters of this group worked year-round.

Focusing on those working year-round, the incremental value of a college education is even more dramatic. For a male, life-time earnings rise $669,229 (from $819,720 to $1,488,949) as education increases from high school (Table 2) to college (Table 3), a gain of 81.6 percent. For a female, lifetime earnings rise $378,167 (from $303,520 to $681,687) as education increases from high school (Table 2) to college (Table 3), an improvement of 124.6 percent.

Another major factor associated with earnings relates to the gender of the individual. Chart 2 shows the life-cycle pattern of earnings of male and female college graduates who worked year-round. The dominant impression emerging from Chart 2 is that annual earnings of male college graduates are substantially greater than those of females. Not evident from Chart 2, but as discussed earlier and taken into account in Table 3, the expected work life of a male is substantially longer than that of a female.

In view of the higher annual earnings and the longer work life, on average, a male college graduate working year-round will earn $807,262 more than a female. A male can expect lifetime earnings of $1,488,949 in 1988

Table 2. Lifetime Earnings of High School Graduates
(Year-Round Full-Time Workers, Present Values in 1988 Dollars)[a]

Age Categories	Annual Earnings	Work Life	Lifetime Earnings
	Male High School Graduates		
18-24 years	$10,271	7.0	$ 71,897
25-29"	18,883	5.0	94,415
30-34"	21,099	5.0	105,495
35-39"	24,522	5.0	122,610
40-44"	26,519	5.0	132,595
45-49"	27,821	5.0	136,930
50-54"	26,386	5.0	131,930
55-59"	26,498	0.9	23,848
		37.9	819,720
	Female High School Graduates		
18-24 years	$ 7,014	7.0	$ 49,098
25-29"	11,130	5.0	55,650
30-34"	12,325	5.0	61,625
35-39"	12,507	5.0	62,535
40-44"	12,601	5.0	63,005
45-49"	12,897	0.9	11,607
		27.9	$303,520

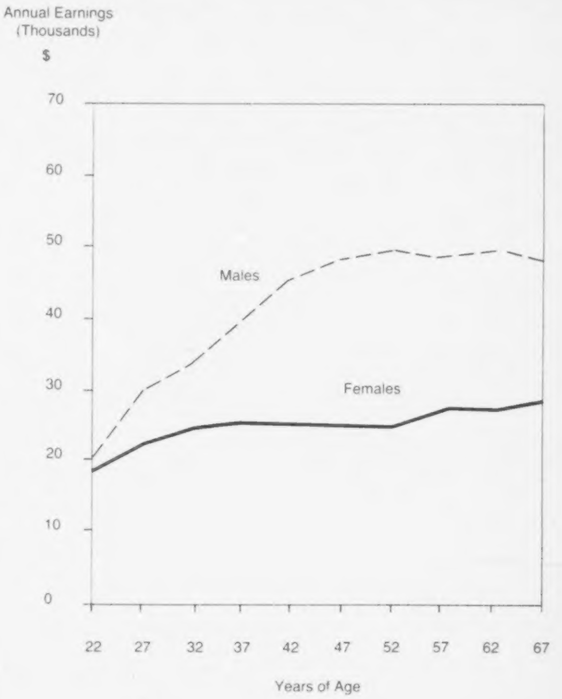
[a]See note to Table 1.

Table 3. Lifetime Earnings of College Graduates
(Year-Round Full-Time Workers, Present Values in 1988 Dollars)[a]

Age Categories	Annual Earnings	Work Life	Lifetime Earnings
	Male College Graduates		
18-24 years	$20,318	3.0	$ 60,954
25-29"	29,533	5.0	147,665
30-34"	33,673	5.0	168,365
35-39"	39,580	5.0	197,900
40-44"	45,355	5.0	226,775
45-49"	48,194	5.0	240,970
50-54"	49,476	5.0	247,380
55-59"	48,522	4.1	198,940
		37.1	$1,488,949
	Female College Graduates		
18-24 years	$18,264	3.0	$ 54,792
25-29"	22,223	5.0	111,115
30-34"	24,388	5.0	121,940
35-39"	24,833	5.0	124,165
40-44"	24,942	5.0	124,710
45-49"	24,564	5.0	122,820
50-54"	24,605	0.9	22,145
		28.9	$681,687

[a]See note to Table 1.

Chart 2. Life Cycle of Earnings of College Graduates
(Value in 1988 Dollars)



dollars. A female college graduate can expect average lifetime earnings of $681,687, less than one-half the lifetime earnings of a male college graduate (see Table 3). If the female's expected work life were the same as a male's, lifetime earnings would reach $894,448, still only about two-thirds the earnings of a comparably educated male.

Concluding Remarks

Notwithstanding the increased out-of-pocket costs associated with attending college, it is reasonably clear that costs fall far short of the future benefits. The present values of the increased earnings associated with graduation from college are substantial. Even if one were to include the earnings foregone while attending college, about $50,000 for a male high school graduate and $30,000 for a female high school graduate, the returns from a college education are well in excess of the costs.

Beyond that, it can be argued that college involves nonpecuniary returns. For many students, life on campus is an immensely pleasurable social experience. Moveover, many people are able to continue aspects of their campus experience throughout the remainder of their lives. Those who attend college may reap other nonpecuniary benefits from their education. In subtle ways, they may move toward insights and skills that improve their ability to interpret the world in which they live. Ideally, an education can contribute to an individual's ability to grow in many dimensions of life.

William R. Bryan and Charles M. Linke are both professors of finance at the University of Illinois at Urbana-Champaign. Professor Bryan is also the department chairman and the editor of the Illinois Business Review.

MARVIN FRANKEL

The Impact of Aircraft Noise on Residential Property Markets

Among the environmental problems receiving increasing attention over the past 15 to 20 years is that of aircraft noise. In Illinois, concern over this issue led in 1977 to a proposal by the Attorney General to the Pollution Control Board for the regulation of noise emissions from the state's public airports. Although the proposal affected a number of airports in some degree, its main thrust was toward the two Chicago airports, O'Hare and Midway, both of which are sited in or near densely populated areas. A large number of public hearings, stretching over several years, were held on the proposed regulation. But ultimately in 1987, following litigation and a court decision that suggested federal preemption in this policy area, the Board suspended its consideration of the matter, and the proposed regulation is now dormant or dead. Meanwhile, expressions of organized concern continue, mainly from groups in the suburban O'Hare area, with remedies sought through the legislature and the courts.

An interesting and important question with regard to any environmental disamenity is, how great a burden does it impose on the affected parties? Both urban economists and home buyers have long recognized that certain neighborhood characteristics such as good (poor) schools, proximity to (remoteness from) shopping facilities, good (poor) municipal services, and quiet (noisy) surroundings tend to be capitalized into residential property values. Thus, a home in a quiet neighborhood with good schools will be worth more than a similar home in a neighborhood lacking those attributes. This circumstance has been utilized by researchers in studies that seek to place a monetary value upon particular amenities and disamenities. In the case of aircraft noise, studies that utilize multiple regression techniques to estimate how residential property values are affected by different noise levels have been conducted at a number of airports in this country and abroad—though not at any Illinois airports. The present study takes a different approach, relying upon the survey method to determine the impact of aircraft noise upon property markets. Subjects of the study are two groups, Realtors® and appraisers, generally recognized to be specialists experienced in and knowledgeable about real estate markets and property values. The respondents were asked about certain characteristics of markets for noisy properties and about the behavior of buyers and sellers in those markets. They were also asked to provide estimates of the effects on property values of various levels of aircraft noise. The survey explored other issues as well, but space does not allow for a discussion of them in this article.[1]

The populations of Realtors® and appraisers surveyed are located in some 40 suburban communities surrounding O'Hare Airport. In the sample drawn for each of the two groups, greater emphasis was given to individuals located in the 20 communities closest to the airport. All of the communities within or astride the 65 Ldn contour[2]—the noise level recognized by the Federal Aviation Administration as a threshold at which significant burdens arise for the residential environment—and many communities proximate to but outside it, were covered in the survey. Completed questionnaires were received from 200 Realtors® and 70 appraisers, representing a response rate for each group of about 50 percent. The total populations of these groups is not fully known. The Realtor®'s sample was drawn from a membership list of the Illinois Association of Realtors® containing in excess of 5,000 names. The appraiser sample was drawn from the consolidated lists of seven appraiser organizations—all that the author could identify—containing a total of approximately 140 names.

Both respondent groups report considerable experience in their respective activities. Median years of practice for Realtors® is 8, while the corresponding figure for appraisers is 10. A significant fraction of each group, but particularly the appraisers, report experience in both brokerage and appraising. Most of the Realtors®—85 percent—and over two-thirds of the appraisers practice their specialty at least 30 hours a week. Real estate activities appear to bring substantially more frequent contact with noisy properties than do appraisal activities. However, the actual difference between Realtors® and appraisers in this regard may be more modest, since half the appraisers also have experience as Realtors® and, through that activity, presumably have gained fuller exposure to properties affected by noise.

The Relative Importance of Factors Affecting Property Values

Notwithstanding the distinctive and disturbing impact that aircraft noise can have on those regularly subject to it, it is but one of a number of factors influencing residential property values in the suburban O'Hare area. How important is its influence as compared to various other location-related variables? Appraiser respondents were asked to rate on a four-point scale—large (1), moderate (2), small (3), and negligible (4)—and the influence of each of a dozen factors on the property value of a "typical" single-family dwelling located within a seven- or eight-mile radius of the airport. The area within this boundary is blanketed by irregularly shaped noise contours ranging from 80 Ldn close to the airport down to 60–65 Ldn and below at the outer edges. Virtually all of the communities within this area are sources of complaints by residents to the O'Hare Noise Abatement Office, though the number of complaints from some of the more distant communities is small.

The results are summarized in Table 1, which ranks the several factors from most important to least important. Two numbers are shown by each factor. The first gives the mean score on the four-point scale, while the second shows the percent of respondents scoring a factor as having small or negligible importance. Differences in mean scores of less than 0.10–0.15 are not significant. Quality of neighborhood, proximity to schools, and amount of property taxes are ranked at the top of the list in importance. Somewhat surprisingly, moderate aircraft noise ranks relatively low on the list, in ninth place, below traffic noise. The mean score of 2.13 for aircraft noise indicates an influence slightly below moderate, and 30 percent of respondents regarded this factor's importance as negligible or small. The low rank might possibly be explained by the widespread presence in the survey area of moderate noise levels, with a consequent tendency to downplay this factor in a comparative assessment. Presumably, a noise level described as substantial or severe would have been accorded a higher ranking.

Table 1. Importance of Factors Affecting Residential Property Values *(in rank order)*

	Mean Score[a]	*Percent of Respondents Indicating Small or Negligible Importance*
1. Quality of other dwellings in neighborhood	1.23	1.4
2. Proximity to schools	1.74	11.4
3. Amount of property taxes	1.78	11.6
4. Proximity to shopping facilities	1.97	14.4
5. Access to main roads	1.97	18.8
6. Quality of municipal services	1.99	20.2
7. Trees, shrubs, parks in neighborhood	2.00	21.7
8. Presence of moderate traffic noise	2.06	23.1
9. Presence of moderate aircraft noise	2.13	30.4
10. Proximity to medical services	2.55	52.2
11. Proximity to jobs at airport and in related activities	2.67	58.8
12. Access to the airport	2.85	69.5

[a] The scale is 1 (large), 2 (moderate), 3 (small), and 4 (negligible).

The lowest-ranked of the characteristics in Table 1 are proximity to jobs in airport-related activities and access to the airport itself. This suggests that homeowners do not see substantial advantages in near-airport locations or that any such advantages are overshadowed by other kinds of location-related characteristics.

The Market for Noise-Affected Properties

The State of Buyer Information

Residential real estate markets, while they lack some of the features of perfectly competitive markets, probably would be thought of as reasonably efficient. At the same time, and on the limiting side, these markets are often characterized by imperfect information, fewness of participants, highly differentiated product and variable product quality, unrealistic expectations of buyers and sellers, and adjustment lags. But most of us might agree that when transactions take place, buyers and sellers are, on the whole, reasonably well matched and that prices settle within a plausible range.

Does the presence of aircraft noise, through its effects on the information needs and the attitudes of buyers and sellers, inject novel or distorting elements into this market process? A few of the survey questions bear on this issue. One such equation, put to both Realtors® and appraisers, asked the following:

> Consider a homebuyer who agrees to purchase a dwelling in an area significantly affected by aircraft noise. From your experience, how well-informed would you say such a homebuyer is about the noise environment of the property?

The question is important because, among other reasons, a knowledgeable buyer engaged in a voluntary transaction may be presumed to be compensated through a lower purchase price for any negative attributes that the property may possess.

The answers to the question, summarized in Table 2, show a diversity of views. Two-thirds of the Realtors® and almost half of the appraisers considered buyers to be either moderately or very well informed. At the same time, while few respondents regarded buyers as simply uninformed, one-third of the Realtors® and the other half of the appraiser group thought of them as being, at best, not very well informed. The results suggest that, judged by the experience of many Realtors® and appraisers, a significant segment of buyers lacks adequate information about the noise environment. Accordingly, their bid prices for properties will tend to be too high, and their expectations for the amenity levels of their dwellings will, following purchase, tend to be disappointed.

Table 2. How Well Informed Are the Buyers of Noise-Impacted Properties? *(Figures show percent of respondents choosing each response category.)*

Responses	*Realtors®*	Appraisers
Very well informed	22.2%	7.3%
Moderately well informed	43.7%	41.8%
Not very well informed	30.5%	45.4%
Uninformed	3.6%	5.4%

Aircraft noise is not unique as a factor about which buyers have imperfect knowledge. Residential dwellings are complex products and home buyers will sometimes lack sufficient information on certain of their attributes. Hence, they will encounter disappointments over faulty plumbing, leaky roofs, or quality of schools. But faulty plumbing and leaky roofs are sporadic events, and school quality may turn out to be better, about as often as it turns out to be worse, than expected. Aircraft noise, on the other hand, blankets whole neighborhoods, and it typically carries unfavorable surprise for the uninformed. More important, it would not seem difficult to improve the state of information on this location attribute.

Other Characteristics of the Market for Noise-Affected Properties

Three questions were asked of Realtors® concerning the behavior of sellers and buyers toward noise-affected residential properties and, implicitly, the pressures on the demand and supply sides that might result. The questions and the responses are summarized in Table 2. As in other questions, a considerable diversity of experience among respondents is indicated.

Only about 9 percent of Realtor® respondents thought it a frequent occurrence for sellers to put their homes on the market wholly or primarily because of disturbance from aircraft noise. But some 47 percent of respondents judged that this occurred at least occasionally, suggesting a higher incidence of dissatisfaction by the occupants of noisy residences and the possibility of a higher turnover rate for those properties. Interestingly, such seller behavior was, at most, a rare occurrence for over 50 percent of the respondents. In the second of the three questions, Realtor® experience indicates a fairly common concern by buyers to avoid dwellings subject to aircraft noise. Some 49 percent of respondents reported encountering this concern frequently, and a further 42 percent reported encountering it occasionally. These results point to a thinner market on the buying side for noisy properties and, taken together with the results of the preceding question, indicate a generally weaker market for that category of residential real estate.

A third question, shown also in Table 2, asked about the frequency with which buyers used the noise factor as a bargaining chip in negotiations with sellers. Some 17 percent of Realtor®-respondents found this to occur frequently, and an additional 42 percent reported it as occurring occasionally. Those who thought it rarely or never happened were in a minority. These responses, along with those to the preceding question, indicate that many buyers are quite aware of the noise problem and give it explicit consideration in their purchase-price calculations. The responses confirm also what economists have long thought to be the case: home buyers are quite prepared to be compensated through a lower purchase price for a property-affecting disamenity such as aircraft noise. The responses further give evidence of the downward pressure on residential property prices that the noise disamenity generates.

A fourth question (not shown in Table 3) asked specifically about property turnover:

> Of the residential areas you are familiar with that are exposed to significant amounts of aircraft noise, would you say that the turnover of properties is . . .

Much below average,	1.3% (1.8%)
Below average,	20.5% (14.0%)
About average,	53.8% (68.4%)
Above average, or	19.9% (15.8%)
Much above average?	4.5%

Table 3. Buyer and Seller Behavior toward Noise-Affected Properties *(Figures show percent of respondents choosing each answer category)*[a]

Question	*Never*	*Rarely*	*Occasionally*	*Frequently*
a. In your experience with the listing or sale of dwellings affected by aircraft noise, how often have the owners indicated they put their homes on the market *wholly or primarily* because of the noise?	25.3% (32.2%)	27.6% (37.3%)	38.2% (25.4%)	8.8% (5.1%)
b. In your experience as a broker, how often have you encountered prospective *home buyers* who indicated a clear desire to avoid dwellings that were subject to aircraft noise?	3.5%	5.2%	42.2%	49.1%
c. In your experience with dwellings affected by aircraft noise, how often have prospective buyers sought a lower-than-listed price specifically because of the noise?	15.3%	25.3%	42.3%	17.1%

[a] Figures in parentheses show responses of appraisers, who also were asked question (a).

The answers show the percentage of respondents choosing each of the alternatives, with the figures in parentheses giving the responses of appraisers. Both distributions are similar and near-symmetrical, with a heavy concentration of responses in the middle. While some respondents indicate above-average turnover for noisy properties, their view is counterbalanced by those judging turnover to be below average. One can marshall arguments for why, a priori, it might be in either direction. But these data rather solidly support the proposition that taken overall, residential property turnover is not affected by aircraft noise.

A final question, asked only of Realtors®, concerned the time required to sell a noise-affected property. The question and responses are shown below:

> Consider the time that elapses from the listing of a residential property to its sale. For properties that are subject to a significant amount of aircraft noise, as compared to similar properties that are relatively free of noise, is this time, on the average . . .

Appreciably greater	22.5%
Somewhat greater	53.2%
About the same	20.7%
Somewhat less, or	3.0%
Appreciably less?	0.6%

Over 75 percent of Realtor®-respondents indicated that the market required more time to move a noisy property than a quiet one, and 22 percent of them thought an appreciably greater amount of time was needed. This may, at least in part, reflect a thinner market for a noisy property, and it may reflect a tendency by the sellers of noisy properties to set unrealistic initial asking prices (perhaps encouraging buyers to seek price concessions). Noisy properties are not, of course, unique in requiring longer-than-average times to sell. One might expect that a property that was handicapped in some way, whether through an awkward design feature or a limiting location, would be slower than other properties in attracting buyers.

To summarize, the set of questions and responses discussed in this section point to a market for noise-affected residential properties that has the following characteristics: pressure on the supply side from some homeowners concerned about noise; weakness on the demand side as some prospective buyers avoid noisy properties while others seek price concessions; and sluggishness in moving noisy properties. All of these features militate toward price weakness and price discounts for noise-affected properties.

The Effects of Aircraft Noise on Property Values

Estimates Based on Respondents' General Experience (Survey 1)

Two of the survey questions directly addressed the issue of valuation. The first of these is shown in Table 4, along with the median values of the responses for both Realtors® and appraisers (in parentheses). The underlying data display considerable variation in judgment by respondents. This is well illustrated by responses for the "Moderate" noise category. Just under one-third of the Realtors® thought this noise level would reduce dwelling values by between 1 and 4 percent. But 29.5 percent thought the reduction would be in the 5–10 percent range, and 23.5 percent put it in excess of 10 percent, while 14.8 percent indicated that dwelling values would not decline at all. Whereas 48.9 percent of Realtors® judged that a "Low" noise level would have no effect on property values, 41.0 percent indicated that a "Severe" noise level would cause values to decline by over 25 percent.

Table 4. Effect of Various Aircraft Noise Levels on Residential Property Values *(Survey 1)*

A property's market value can be affected by many factors. In the opinion of some people, a single-family residential property will be reduced in value if, *with all else unchanged*, it is more-or-less regularly subjected to significant amounts of aircraft noise. Based on your professional experience, please indicate in the table below by how much, if at all, *each specified noise level*, occurring on a more-or-less regular basis, reduces a property's market value.

Summary of Responses:

	Median Reduction	
	Realtors®	*Appraisers*
Noise Level		
Low (60–65 Ldn)	1.6%	1.2%
Moderate (65–70 Ldn)	5.5%	3.0%
Substantial (70–75 Ldn)	13.0%	10.0%
Severe (75–80 Ldn)	21.6%	16.5%
Sample Size (n)	199	69

The individual responses are doubtless affected by subjective factors. Respondents may differ somewhat in their interpretations of the noise levels specified in the question; they may err in relating those noise levels to the particular properties they have dealt with; and they may make implicitly faulty comparisons of those properties with the norm of an otherwise equivalent but quiet property. Further, some of the respondents may have limited and atypical experience with noisy properties. Yet one expects—and hopes—that the errors are largely offsetting and that an average of the responses will approximate the underlying value that is sought.

The results of Survey 1 in Table 4 show that for Realtors® the median values range from a low of a 1.6 percent reduction in property value for the low noise category to a high of 21.6 percent for the severe noise category. The corresponding figures for appraisers are 1.2 percent and 16.5 percent. Note that the median estimates for appraisers are consistently below those for Realtors® by 25–45 percent. Because the "Over 25 percent" category is open-ended, arithmetic means of the responses cannot be calculated.

Estimates Based on Neighborhood-Specific Knowledge (Survey 2)

The second, more demanding, question on valuation was posed in the following two steps:

> Please specify in the table below, for each noise category, the names of up to three of the noise-affected areas or locations that you serve. Identify them, if possible, by name of community and geographic sector thereof (e.g., southwest Franklin Park, northwest Arlington Heights, Villa Estates in west Des Plaines). Now enter in the table, for each of the locations you have identified, your estimate(s) of the (average) percent by which, with all else unchanged, the market value of a residential property is diminished by aircraft noise. (If the value is unaffected, enter 0%.)

The table provided entries for three noise categories moderate, substantial, and severe—and as indicated above, up to three entries could be made under each category.

The results of Survey 2, in the form of mean percent reductions in property values, for both Realtors® and appraisers and for single- and multi-family dwellings, are shown in Table 5. There are three noteworthy features of these results. First, the discount percentages for the appraiser group are, like the corresponding percentages in Table 4 (or Survey 1), consistently below those of the Realtor® group. There is no obvious explanation for this outcome, and its rationale remains a source of speculation.

Table 5. Effect of Aircraft Noise Levels on the Values of Single- and Multi-Family Properties *(Survey 2) (Figures show the mean percent reductions for each noise category)*[a]

	Noise Level		
	Moderate (65–70 Ldn)	*Substantial (70–75 Ldn)*	*Severe (75–80 Ldn)*
Realtors®			
Single-family	3.9% (0.29)	9.6% (0.47)	16.4% (0.81)
Multi-family	2.6% (0.48)	6.8% (0.60)	12.9% (0.90)
Appraisers			
Single-family	2.7% (0.34)	6.3% (0.57)	12.7% (0.98)
Multi-family	2.0% (0.41)	4.1% (0.62)	9.7% (1.21)

[a] Figures in parentheses are standard errors.

The second feature of note is the consistently lower discounts—25–33 percent lower—assigned by both Realtors® and appraisers to multi-family properties as compared with single-family residences. A plausible explanation for this result is that renters, as mobile and short-term occupants, are less concerned about certain kinds of environmental amenities, or lack thereof, than are homeowners. They know their stay is temporary; they are free to move (within the limits of their leases) if their housing situations do not work out well; and their residency does not entail commitment to an expensive and vulnerable asset. Their bid-rents are, thus, subject to smaller discounts than the bid prices of prospective homeowners, with these differences ultimately reflected in the differential discounts for the two types of properties.

The third point of note involves a comparison of the results of Survey 1 with those of Survey 2. The mean discount values in Survey 2 for single-family residences are consistently below the corresponding median discount values in Survey 1, and this in turn implies, with a possible exception, that they are below the associated (but unknown) mean values that underlie the Survey 1 results. (This can be inferred from the underlying data.) The explanation for this result may lie in the way each of the two sets of questions was put to respondents. In Survey 1, respondents are called upon for general judgments about the magnitude of the noise discount, without regard to specific evidence and particular situations they may have encountered. In Survey 2, they are asked to name communities and neighborhoods and, from their own experience, to supply a discount figure, rather than choosing from a list. It should be mentioned also that respondents for Survey 2 comprise a narrower group than those for Survey 1. Those who dropped out may consist predominantly of individuals who are less experienced and less well informed.

Concluding Note

The juxtaposition of a major airport with large and numerous residential communities generates a classic kind of environmental conflict. On the one hand are the beneficiaries of air travel—the air lines and their passengers—whose rapid and convenient movement is facilitated by the airport. On the other are the property owners located proximate to the airport and subject to the burdens of noisy overflights. Measures to moderate this conflict call for a comparison of the costs of any proposed method of mitigation with the consequent reduction in the burden on affected property owners. Within this context, the estimates of property value discounts presented above are of more than casual interest, for they can be used to indicate the approximate benefit to be gained from a proposed mitigation measure. Thus, a preferential runway procedure or the addition of a new runway that would reduce aircraft noise over a designated residential area from (say) 77–78 Ldn to 72–73 Ldn could be expected (from Table 4) to raise property values, with corresponding benefits to residents, by 6.5 percent (appraisers) to 8.6 percent (Realtors®). Should the airport authority consider the alternative of purchasing avigation easements on a group of affected properties, the data in Tables 4 and 5 might be used in estimating the market worth of those easements.

The impact of aircraft noise on residential areas is a complex phenomenon that affects the behavior of home buyers and sellers and that, in particular situations, is capable of generating intense controversy among the interested parties. It helps to keep the problem in proper perspective by recognizing that, as noted early in this article, noise is but one of many factors affecting housing values, that even where severe, its impact is bounded and approximately measurable, and that its effects often are susceptible to mitigation. However, the more built up is the area around the airport, the more limited will be the opportunities for mitigation. In this respect, O'Hare and Midway airports are difficult cases.

Notes

[1] The full report on the survey is titled, "The Impact of Aircraft Noise and Aircraft Activity on Residential Property Values: A Survey Study." Interested readers may obtain a copy by writing to the Office of Real Estate Research, University of Illinois, 304 David Kinley Hall, 1407 West Gregory Drive, Urbana, Illinois 61801.

[2] Ldn is a measure of the average sound energy emitted over a defined period of time, in this case one year. It includes a penalty weighting for noise emissions during the hours of 10 p.m. to 7 a.m., since they are judged to be more disturbing.

Marvin Frankel is a professor of economics at the University of Illinois at Urbana-Champaign and is currently the Acting Director of the Bureau of Economic and Business Research. This study was funded in part by the Office of Real Estate Research.

Illinois Business Indexes

The economic outlook for Illinois continues to show strong improvement. Interpretation of leading indicator data results in a different forecast from the projection of the Illinois Econometric Model (see page 16). As Chart 1 illustrates, the current indicator has been above the trend indicator for most of 1988. This movement in the Composite Leading Indexes points to a continuation of the economic expansion over the next several quarters.

Although state unemployment has remained above the national rate during the past few years, growth in the Illinois economy is reflected by the general uptrend in manufacturing employment (see Chart 2) in the northwestern region and the greater Chicago area. At the same time, retail sales show clear growth during the same period in 1987.

Chart 3 illustrates the help wanted indexes. These numbers measure the volume of classified advertising in major newspapers, and they also show great sensitivity to changes in the demand for labor. In July, Chart 3 indicates that Chicago and St. Louis follow the same general trend. The Chicago index increased by 1.70 percent and the St. Louis index increased by 4.22 percent, reflecting an improvement in general business conditions.

The change in the number of building permits constitutes a good indicator of general economic conditions. Due to seasonal factors, the growth in residential housing permits remains below average during the winter months (see Chart 4). In spring, as expected, the number of new permits grew, but the current year still shows a weak performance as compared with 1987.

Inflationary pressures started to emerge in the US economy and also in its North Central region. Chart 5 shows that inflation has increased in the Chicago area for the past two months, but this increase in the price level has remained markedly below the levels reached in the past year.

ILLINOIS BUSINESS INDEXES

	Percent Change July 1977–July 1988	*July 1988*	*June 1988*	*May 1988*	*April 1988*	*July 1987*	*June 1987*
Leading Indicator (Current Indicator)	4.89[a]	15.27	14.06	13.32	12.5	10.38	11.49
Leading Indicator (Trend Indicator)	2.53[a]	13.72	13.57	13.25	13.08	11.19	12.55
Employment-manufacturing (in thousands)[b]	1.80%	947	949.7	943.9	944.4	930.3	929
Average weekly hours-manufacturing[b]	0.00%	41.6	41.9	41.6	41.8	41.6	41.8
Weekly earnings-manufacturing[b]	2.02%	$462.18	$464.67	$460.10	$463.14	$453.02	$454.78
Help wanted advertising-Chicago (1967 = 100)[c]	-0.83%	119	117	114	115	120	120
Help wanted advertising-St. Louis (1967 = 100)[c]	15.63%	74	71	75	71	64	68
Retail sales (in millions)[d]	4.91%	$6,245	$6,596	$6,627	$6,135	$5,953	$6,163
Coal production (in thousands of tons)	–0.76%	4,057	4,275	5,068	4,624	4,088	4,979
Petroleum products (in thousands of barrels)[b]	–1.48%	2,000	1,990	1,980	1,985	2,030	1,980
Vendor performance[e]	9.68%	68%	70%	66%	62%	62%	57%
Building permits (in thousands)							
Residential housing units	–8.09%	4.112	4.991	4.632	4.112	4.474	5.101
Value of residential housing	1.65%	$348,018	$419,199	$384,122	$346,092	$342,356	$391,383
Value of nonresidential construction							
Industrial buildings	72.18%	$30,471	$32,728	$30,585	$16,511	$17,697	$26,543
Office, banks, and professional buildings	4.69%	$43,233	$52,488	$65,638	$28,256	$41,298	$66,837
Stores and other mercantile buildings	–0.10%	$50,288	$59,009	$47,211	$33,886	$50,338	$36,555
Other	38.55%	$11,870	$6,211	$11,589	$5,127	$8,567	$7,542
Consumer price index (1982-84 = 100)							
North Central US	3.90%	116.6	116.0	115.5	114.9	112.2	112.1
North Central/population more than 1,200,000	3.97%	117.7	117.0	116.0	115.7	113.2	113.0
North Central/population 360,000 to 1,200,000	3.87%	115.8	115.6	115.7	115.0	111.5	111.5
North Central/population 50,000 to 360,000	4.18%	116.6	116.1	116.1	115.2	111.9	111.7
North Central/population less than 50,000	2.98%	113.5	112.8	112.2	111.8	110.2	109.8
Chicago	3.41%	119.8	118.9	117.0	117.1	115.8	115.5
St. Louis	2.94%	116.0	—	114.1	—	112.7	—
		1988:1	1987:4	1987:3	1987:2	1987:1	1986:4
Personal income (in millions)[b,f,g]	6.16%	$197,330	$196,140	$189,036	$186,487	$185,885	$181,893
Per capita personal income[b,f,g]	5.86%	$16,980	$16,890	$16,290	$16,082	$16,041	$15,708

[a] Represents absolute change (percent change not relevant). [b] Recent month is preliminary figure. [c] The Conference Board, *Help Wanted Advertising*, July 1988; seasonally adjusted. [d] Latest month projected by BEBR. [e] Percentage of companies receiving slower deliveries. [f] Seasonally adjusted at annual rates. [g] Percent change between 1987:1 and 1988:1.

Chart 1. Composite Leading Indicators *(average percent change in base indexes)*

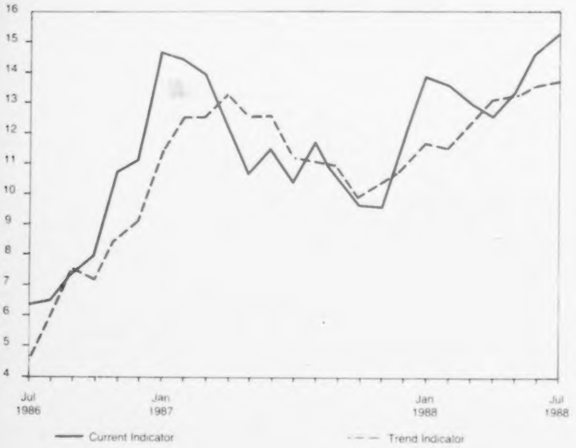


Chart 2. Employment—Manufacturing *(in thousands)*

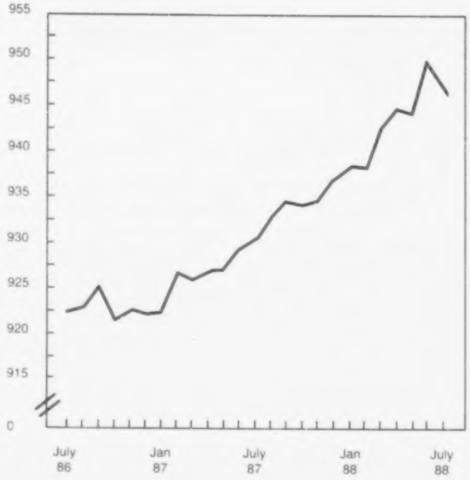


Chart 3. Help Wanted Advertising Indexes *(percent change from previous month, seasonally adjusted)*

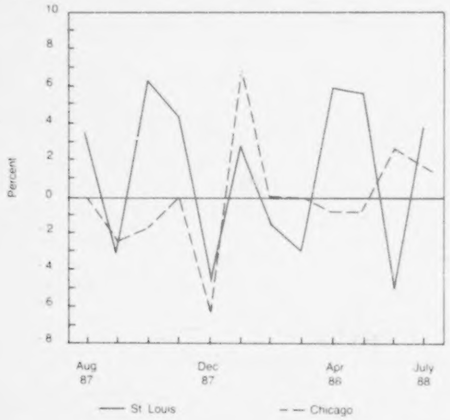


Chart 4. Residential Housing Units

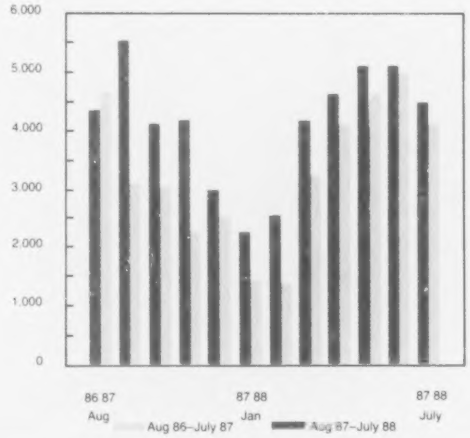


Chart 5. Year-to-Year Change in Selected CPI

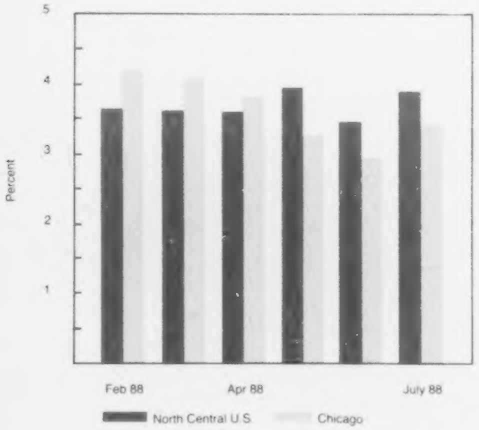
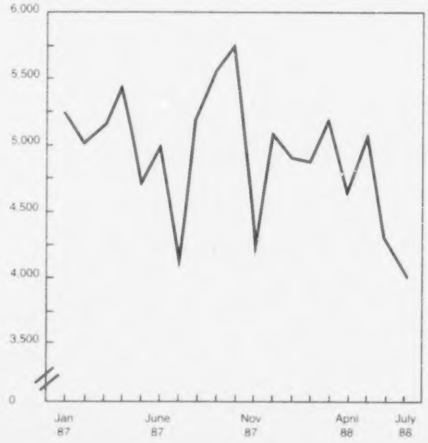


Chart 6. Coal Production *(in thousands of tons)*



Illinois Business Review

Second-class postage paid at Urbana, Illinois.

CONGRESSIONAL INFO SERVICE, IN
SRI
4520 EAST - WEST HIGHWAY
BETHESDA MD 20814

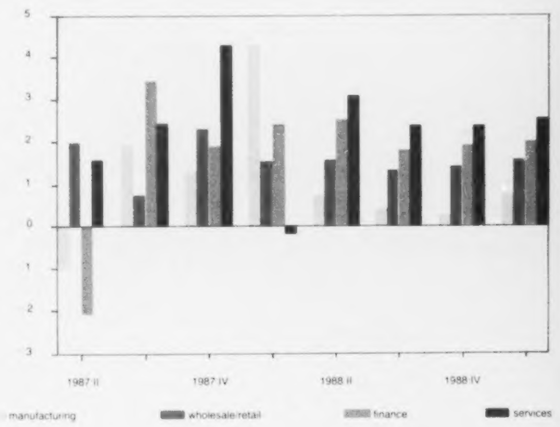
Bureau of Economic and Business Research
428 Commerce West, 1206 South Sixth Street
Champaign, Illinois 61820

Illinois Economic Outlook

The Illinois Econometric Model predicts a slowdown in the growth in personal income. The projection generated by the model is markedly at variance with the forecast obtained from the leading indicator data (see page 14). A predicted growth of 4.8 percent in 1988 is down slightly from the 5.5 percent growth in 1987. However, the increases are almost totally offset by increases in the price level. As a consequence, the growth in real income will average about 0.7 percent in 1988, less than one-half the 1.8 percent growth in 1987. Looking ahead, the forecast for 1989 indicates that nominal income growth will not keep pace with the rising price level, resulting in a decrease in real income. A breakdown of personal income by sector is given in the table.

The chart shows the quarterly changes in nominal income for the largest sectors of the state's economy. Small increases are expected in manufacturing and wholesale and retail trade. The service sector will continue to perform better than the other sectors of the economy after recovering from a slight decline in the first quarter of 1988. Overall, the forecasted performance of the Illinois economy, as measured by personal income changes, is not encouraging.

Illinois Personal Income *(percentage change from previous quarter)*



Illinois Seasonally Adjusted Personal Income *(nominal, at annual rates)*

	History				*Forecast*			
	1987:II	1987:III	1987:IV	1988:I	1988:II	1988:III	1988:IV	1989:I
Total personal income (in millions)	$186,487	$189,036	$196,140	$197,330	$198,828	$200,315	$202,384	$205,524
Private nonfarm	118,908	120,979	124,038	126,538	128,626	130,232	131,851	133,892
Mining	1,371	1,394	1,405	1,420	1,452	1,439	1,425	1,418
Construction	8,347	8,310	8,560	8,814	9,116	9,125	9,102	9,128
Manufacturing	28,995	29,553	29,938	31,226	31,459	31,595	31,686	31,932
Durable	17,809	18,242	18,459	19,349	19,463	19,490	19,488	19,583
Nondurable	11,186	11,311	11,479	11,877	11,995	12,105	12,199	12,348
Utilities and transportation	10,804	10,915	11,053	11,314	11,532	11,538	11,559	11,632
Wholesale and retail trade	23,694	23,869	24,422	24,806	25,203	25,546	25,915	26,341
Finance, insurance and real estate	12,395	12,824	13,068	13,389	13,731	13,981	14,254	14,546
Services	32,842	33,648	35,098	35,034	36,133	37,008	37,910	38,895

Bureau of Economic and Business Research